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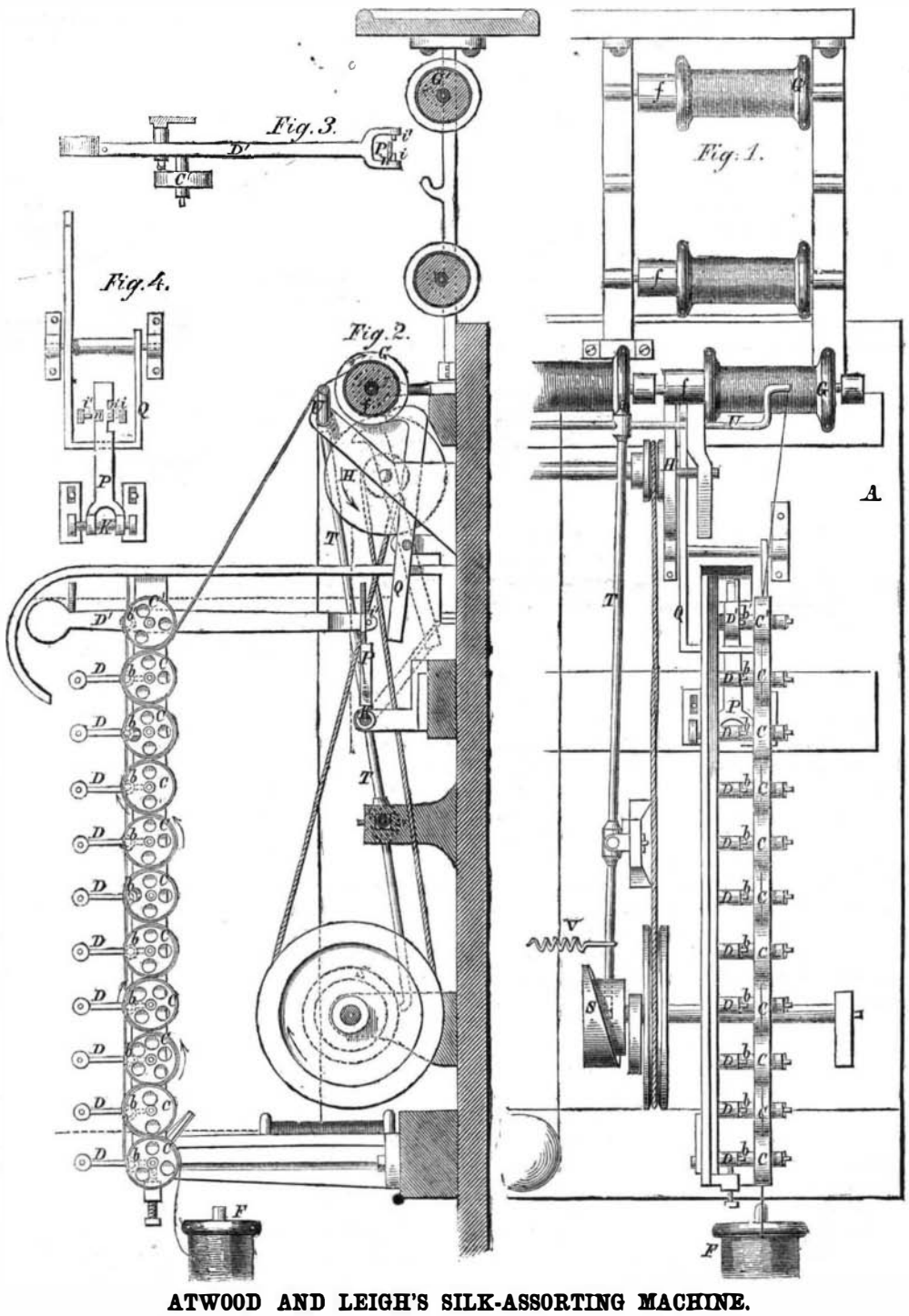
Improved Silk-Assorting Machine.

All butterflies, moths or millers come into existence as worms or grubs. The grub is hatched from the egg, grows to maturity and then changes into a curious mummy-like form called the chrysalis. In this state it is dormant, and appears to be dead; but the forces of nature are busy in its structure, changing it so strangely from the crawling worm into the perfect and beautiful insect that floats away above the earth upon its gossamer wings, these metamorphoses affording the most forcible suggestion that is furnished by nature of the possible change of men from the animal to the angelic state. During its dormant condition the chrysalis would be very liable to be eaten by birds or otherwise destroyed, did not Nature make provision for its protection, and numerous are the contrivances to which she has resorted for this purpose. The plan which she has most commonly employed is to teach the worm to weave a little house around his person from matter secreted in his body before he passes into his immovable and helpless condition. The thread with which the insect, *bombyx*, builds the cocoon for his habitation during his chrysalis state is of so strong, smooth and glossy a character that it has been appropriated by man for his most beautiful garments. It is known in the English language by the name of silk.

The individual fibers of the silk cocoon are so attenuated that several of them are combined to make the very finest thread. The fibers also differ very much in size, and this variation has been a source of great difficulty to silk manufacturers, especially in making sewing silk; and more especially that which is to be used in sewing machines. For these machines it is very important that the thread should be of uniform size, and great efforts have accordingly been made to accomplish this result, efforts which have resulted in notable improvements in the evenness of sewing silk since the introduction of sewing machines.—Most of these efforts have been directed to the more careful assorting of the raw silk in parcels of uniform size; and several machines have been invented to facilitate the operation. The accompanying engravings illustrate one of these machines, invented by John. Atwood, of Mansfield, Conn., and Lewis Leigh, of Seymour, Conn., and for which patents have been procured through the Scientific American Patent Agency, in England, France and the United States.

It is a device by which variations in the size of the thread are multiplied several fold, and the thread is wound in three sizes upon as many spools. Fig. 1 of the engravings is a front view of the machine, and



ATWOOD AND LEIGH'S SILK-ASSORTING MACHINE.

Fig. 2 a vertical section. A series of light smooth rollers, C C C, are hung upon the ends of counterbalanced levers, D D D D D′, in such a manner that they may rest lightly one upon the other, as clearly shown in Fig. 2. The levers are suspended on their fulcra, *b b b b*, with weights upon their outer ends to nearly counterbalance the weight of the rollers, C. The thread from the bobbin, F, is then carried over, under and between the rollers in the manner represented in Fig. 2, and led to the receiving bobbin, G, upon which it is wound. It will be seen that any increase in the size of the thread will raise the next to the lowest roller a little, the next roller above twice as much, and so on until the increased size is indicated by a motion of the upper roller a number of times greater than the actual increase of size corresponding to the number of the rollers, C.

The lever, D′, upon which the upper roller, C′, is hung, is lengthened, as represented in Fig. 2, in order to increase the motion of its end, and then this motion is made to throw the receiving bobbin, G, out of gear whenever the size of the thread varies. For this purpose the lever is constructed as represented in Fig. 3, which is a plan view as seen from above. The end of the lever is forked and embraces the end of a lever, P (see Fig. 2). The lever, P, is inclined, and would fall outward from between the forks of the lever, D′, were it not held by the pins, *i* and *i*′. To permit the lever, P, to fall out from between the forks, and to throw the receiving bobbin out of gear whenever the end of the lever, D′, is raised or lowered by variations in the size of the thread, notches are cut in the edges of the lever, P, as shown in Fig. 4. The engravings represent the bobbin, G, in gear, which is intended to receive the medium-sized thread. The lever, P, now rests against the pin, *i*, and will thus rest as long as the vibrating end of lever, D′, retains its position. But should a larger thread enter between the rollers, C C, the end of lever, D′, would be raised, and the pin, *i*, would be brought opposite the notch, *n*, in the lever, P, allowing the lever, P, to fall out from between the forks of the lever, D′. As the lever, P, falls forward it strikes the lower end of lever, Q, carrying the bent upper end of this lever under the pulley, *f*, of bobbin, G, lifting this pulley out of contact with the friction roller, H, by which the bobbin is driven. This of course stops the winding of the thread upon the bobbin, G, which reminds the operator to change the bobbins. He accordingly substitutes for the ob-

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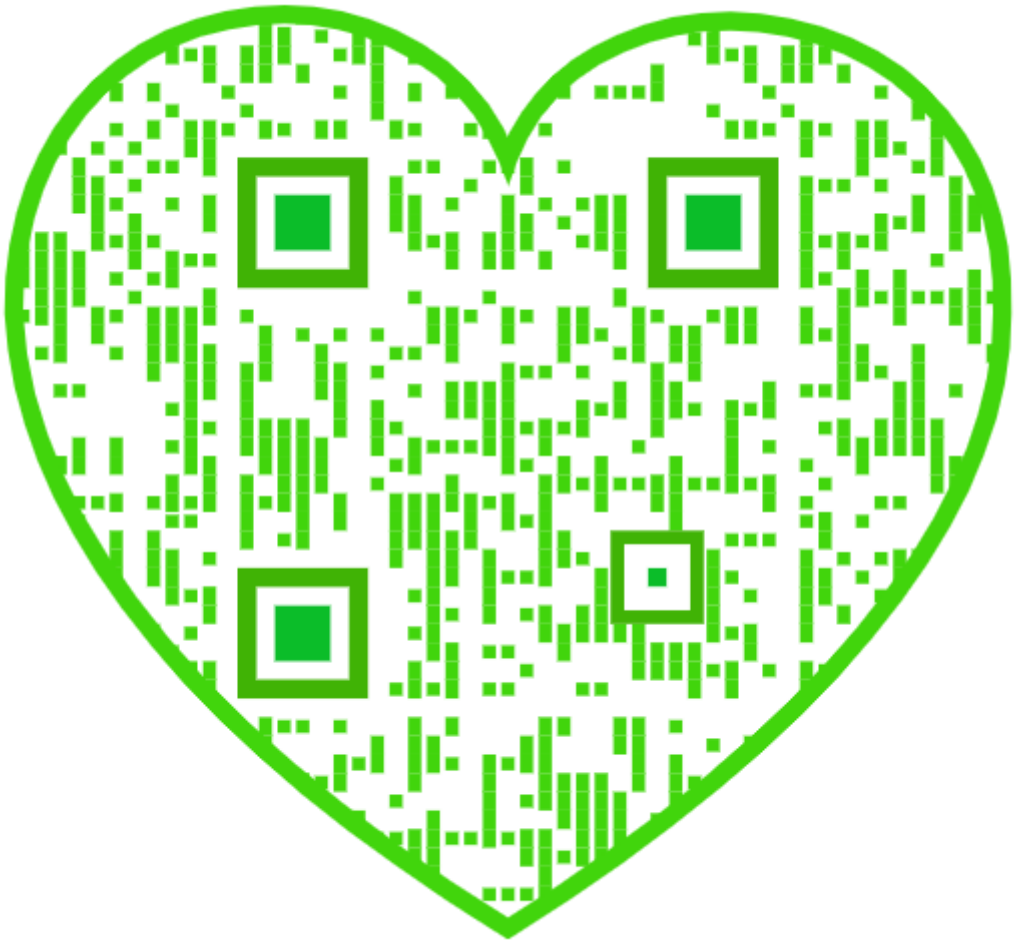

bin, G, the bobbin, G′, which is designed to receive the largest-sized thread. At the same time he slips the lever, F, sideways upon its fulcrum, *k* (see Fig. 5), when it rests against the pin, *i*′; this pin being raised above the notch, *n*, by the elevation of the lever, D′. The work now proceeds as before, until a section of smaller thread enters between the rollers, C C, when the end of lever, D′, falls, bringing the pin, *i*′, opposite the notch, *n*, in the side of lever, P; allowing the lever, P, again to fall forward and lift the bobbin out of gear. The action of a section of smaller thread is so similar that it needs no separate explanation.

The rod, U, is a guide for winding the thread upon the bobbin in regular spirals. It is secured to the upper end of the lever, T, the lower end of which lever is drawn against the cam, S, by the spring, V.

By this machine the variations in the size of the thread are so multiplied that the thread can be assorted in different sizes with the most delicate accuracy.

NOTES ON MILITARY AND NAVAL AFFAIRS.

THE SITUATION.

The situation of affairs is assuming great interest, and the impatient public are beginning to feel that some heavy blows will speedily be struck directly at the head of the rebellion. It is said that when Gen. McClellan was recently upon his sick bed, some intimate friend, fearing possibly that his sickness might prove fatal, urged upon him the importance of divulging his plans to some trustworthy person. The General replied that his plans were well understood, and that when the storm began the people would hear it thunder all through the sky. The first clap of thunder comes from Somerset, Ky., the chief town of Pulaski County. It has cheered and warmed the loyal blood, and makes us all feel better.

THE BATTLE OF SOMERSET.

The most important battle of the war, in some respects, was fought at the above-named place on Sunday the 19th of January. The secession forces, under Gen. Felix K. Zollicoffer, of Tennessee, were strongly intrenched on the banks of the Cumberland river. Zollicoffer had selected the mountainous region on either side of a bend in the river, commanding all its approaches on both sides, as well as the valleys of White Oak and Meadow Creeks. The position is also the key to East Tennessee, and is therefore one of great strategic importance, as the residents of that section of Tennessee are loyal to the core, and have awaited month after month with a good deal of impatience for the approach of the Union forces. Full particulars of the battle have not yet reached us, but we will endeavor to make the best use possible of the meager details. Zollicoffer's forces previous to the battle are reported twelve thousand, intrenched, and defended by eleven pieces of artillery and twenty heavy cannon. The exact number of Union forces engaged is not stated, but probably they were not equal to those of the enemy. Gen. Schoepff was in command of a Union brigade which consisted of Ohio and East Tennessee troops, and was reënforced previous to the battle by the brigade of Gen. Thomas. Zollicoffer, fearing that he might be cut off in the rear, determined to bring on an engagement, and in order to effect this object he sallied forth with his forces, leaving his intrenchments behind and boldly attacked the Union forces at Somerset, and after a severe battle, which lasted from early in the morning until near dark, the secessionists were completely routed and fled in confusion toward their intrenchments. Gen. Zollicoffer fell mortally wounded, and his body was found by our forces in a wagon. On the same day, Gen. Thomas followed up the enemy to their intrenchments, some sixteen miles from his encampment, and when about to renew the attack upon them in the morning he found their intrenchments deserted. The enemy left all their cannon, ammunition, stores, tents, horses, wagons, &c. They used a steamer and some barges during the night to cross Cumberland river, and then fled in every direction. The steamer and barges are now in the possession of our forces. Gen. Schoepff endeavored to get in the rear of the routed troops so as to cut off their retreat, but owing to the obstruction of the roads by felled timber and the bluffy character of the country he found it difficult to do so; but there are hopes of his success. The victory is reported as complete and brilliant in every respect. The enemy fled in utter consternation after the death of their general, and it is probable that by this time the secessionists will be prepared to admit they can run quite as well as the Yankees. Gen. Thomas reports the Union lost at 39 killed and 127 wounded, and of the secessionists 115 killed, including Gen. Zollicoffer, 116 wounded, and 45 prisoners. He also reports the capture of a large amount of property. We have already announced that Gen. Alvin Schoepff was at one time an Assistant Examiner in the Patent Office. We knew him well and always entertained a high opinion of his good qualities. He was assistant to a dull secessionist by the name of French, and did all the important labor of the department.

We think Schoepff is a Hungarian by birth, and an exile from his native land, owing to the active part he took in the revolution against the Austrian government. He came to this country poor and made his way to Washington, where he attracted the attention of Hon. Joseph Holt, then Commissioner of Patents, who gave him a situation in the Patent Office. When Commissioner Holt was transferred to the War Department he took Schoepff with him, and as a survey was needed in Virginia he was entrusted with it. This brought him under the then Commander-in-Chief, General Scott, and as his military education and acquirements became known to him the veteran General did not overlook them, but continued to employ him on important business in connection with the War Department. When the troubles in the country and the recreant retirement of many of the officers of the United States Army made it necessary to employ foreign officers of military talent, Alvin Schoepff was appointed a Brigadier General of volunteers, and ordered to report to the commander of that department in which the State of his benefactor was located. He has made himself known at Wild Cat, and again at Somerset, and if given the opportunity there is but little doubt but that he will again be heard of, although Zollicoffer is no longer opposed to him.

Brigadier-General George H. Thomas, is an officer of the United States army and a native of Virginia. He is a graduate of West Point and served with gallantry in Mexico, and for his meritorious services was breveted Major. In 1850 he was appointed the instructor of artillery and cavalry at the Military Academy at West Point. In December, 1853, he was made a full captain of artillery, and on the 12th of May, 1855, was appointed Major of the Second cavalry. On the resignation of his senior officers at the commencement of the rebellion, General Thomas was promoted to the Lieutenant colonelcy of his regiment, and on the 3d of May, 1861, was made Colonel of the Second cavalry. As Colonel he had chargeeof the United States regular forces under GeneralPat trson, in the Department of the Shenandoah, and led the passage of the troops across the Potomac. He was next appointed an acting Brigadier General in the same department, in which capacity he served under General Banks. On the 17th of August, 1861, he was promoted to the rank of Brigadier General of Volunteers, when Kentucky and Tennessee were made into a separate department. These are gallant Generals. We honor them both equally and alike.

The Hon. Secretary of War, upon receiving the news of the glorious victory, issued the following stirring General Order :—

WAR DEPARTMENT,
Washington, Jan. 22, 1862.

The President, Commander-in-Chief of the Army and Navy, has received information of a brilliant victory, achieved by the United States forces over a large body of armed traitors and rebels, at Mill Spring, in the State of Kentucky. He returns thanks to the gallant officers and soldiers who won that victory, and when the official report shall be received, the military skill and personal valor displayed in battle will be acknowledged and rewarded in a fitting manner.—The courage that encountered and vanquished the greatly superior numbers of the rebel force, pursued and attacked them in their intrenchments, and paused not until the enemy was completely routed, merits and receives commendation. The purpose of this war is to pursue and destroy a rebellious enemy, and to deliver the country from danger. Menaced by traitors, alacrity, daring, courageous spirit and patriotic zeal on all occasions and under every circumstance are expected from the army of the United States. In the prompt and spirited movements and daring at the battle of Mill Spring, the nation will realize its hopes, and the people of the United States will rejoice to honor every soldier and officer who proves his courage by charging with the bayonet and storming intrenchments, or in the blaze of the enemy's fire. By order of the President.

EDWIN M. STANTON, Secretary of War.

GEN. LANE'S EXPEDITION.

James H. Lane, Senator from Kansas, has recently been confirmed a Brigadier General in the army, and has resigned his seat in the Senate. He has gone West to organize and put in motion a formidable expedition, to operate in Southwestern Missouri, Arkansas and the Indian Territory, and as much farther south as he chooses to proceed. It is understood to be his determination to proceed to the Gulf of Mexico. His forces will consist of 15,000 cavalry, 10,000 infantry, 1,000 flying artillery, 1,200 fusileers, 4,000 loyal indians and 1,000 negroes, the latter acting only to drive horses, to cook, to collect forage, to serve food to soldiers, cut timber and take care of the sick and wounded. The troops will be picked, able-bodied Western men. One of the regiments will be made up of miners, and another will be composed entirely of mechanics, such as railroad and bridge builders, wagon makers, blacksmiths, iron foundery men, harness makers, boat builders, &c., who will be equipped with all needful tools and implements, the government having appropriated $210,000 for that purpose. The expedition will carry with it a horse-power sawmill and 500 portable or hand flourmills. No supplies will follow, as it is the intention that the army shall feed itself from the resources of the country and from the rebels' granaries while on its march. The government is to be subjected to no expense after the outfit is provided, as the men will take care of themselves after the orders to march are issued.

MILITARY TELEGRAPH.

The army telegraph now consists of over one thousand miles of wire stretched through the different camps, from the headquarters of Gen Hooker on the left, running toward the right wing till it reaches Hancock, Md. One hundred and and ten operators are in the employ of the government. There is a separate line to the headquarters of each General commanding a division. Gen. McClellan can sit at the table in his private house, and talk to the different Generals, all at one and the same time, and independent of one another. When any division moves the line can also be extended, as each division has a corps of builders, and a supply of wire, poles and insulators always ready. In several divisions, each Brigadier-General has an instrument upon the line, and is in direct conference with his immediate commanding General the whole time. Large wagons have been provided for the operators and their batteries to travel in, with sleeping apartments, tents, equipage and everything necessary, thus making the telegraphic department the most efficient and thorough branch in the whole army; and in connection with the balloon corps of Prof. Lowe, will, should the army move, prove invaluable to detect the operations of the enemy.

MILITARY ROADS.

The House Committee on Roads and Canals have under consideration a number of important and interesting propositions. Among them is the construction of a military road between the loyal and disloyal States, recommended in the President's annual message. The increase of the facilities for the transportation between Washington and New York is also a subject of consideration. One proposition is to construct a new road direct from Washington to this city; another provides for the construction of double tracks and sidings on existing routes. With a view to prepare a bill providing for the repair and protection by the government of the Baltimore and Ohio Railroad where it has been destroyed, and is now obstructed by the rebels, a resolution has been submitted by the committee, asking information from the War Department as to the amount of military force, and the time when it can be spared for this purpose. The committee are prepared to show that the government have incurred an expense of $3,000,000 on account of the obstructions to this thoroughfare.

THE NEW SECRETARY OF WAR.

The new Secretary of War, Mr. Stanton, has entered upon the duties of his office, and in accordance with an order issued by Gen. McClellan, all the army offi-

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cers in Washington called to pay their respects to him on the 20th ult. The Secretary received the officers with great cordiality, and with a care unusual on such occasions he allowed no officer to pass until he distinctly learned his name and exact position, which seemed to please them very much.

BOMBARDING PENSACOLA.

New Year'sday was celebrated by another bombardment of Pensacola. The Secessionists sent a steamer down to the Navy Yard and Col. Brown fired upon her as soon she was within reach to which the secession batteries replied, and the firing was kept up on all sides until seven P. M., when Col. Brown gave the order to cease firing and Fort Pickens shut up shop for the night. The other batteries did not cease, however. Fort Barrancas, the Navy Yard batteries, and the battery near Fort McRae all played upon Pickens, but without doing any damage, although the shells fell fast and thick in the fort. One shell fell into the culinary department of Fort Pickens, disarranging matters there to some extent. Another struck the wall, and, glancing off, struck a man obliquely on the back. He was considered dead for a few minutes, but was soon himself again. The firing, with the exception of Fort Pickens, was kept up pretty steadily all night, and at eleven o'clock the entertainment was varied by the addition of a fire. The officers' quarters and several buildings in Warrington were burned. The firing was not renewed in the morning, the rebels doubtless considering it a waste of ammunition.

MISCELLANEOUS.

Major Doubleday, who served the flag so faithfully at the bombardment of Fort Sumpter, has recently been appointed by the President a Brigadier-General. This is a good appointment.

It is asserted as a fact that Col. Garfield won his recent victory over Humphrey Marshall without using any artillery. Gentlemen who seem to know the truth of what they declare assert that the Colonel asked Gen. Buell to send him artillery, but the Commanding General, instead of sending cannon, directed him to go without such incumbrance, assuring him he would only have the better luck. The result, it would seem, has abundantly sustained such opinion.

The indications are that the troops at Rolla, Mo., under command of Gen. Franz Sigel, will move westward, except one or two regiments to guard the post. Price is at Springfield, and it is reported that he has been reënforced by recruits, and has now some 20,000 men. Price is a wily chap. He fights only when he finds a small opposing force, and runs when danger approaches.

One of the coolest pieces of impudence we have noticed lately is recorded by the St. Louis *Democrat*. A Mrs. Letchworth, of Lexington, has presented an account to the United States Commissioners of Claims in that city for a wagon and a pair of mules which she presented last summer to General Sterling Price, and which were afterward captured by Gencral Lane's forces.

Preparations are being made at the Navy Yard to test the strength of the new rifled cannon finished there. One of them—a 32-pounder—has been inclosed with heavy timber, and will be fired with constantly-increasing charges until it bursts.

A gallant exploit, under the guns of Fort Caswell, near Wilmington, N. C., recently took place, which sheds additional luster upon our navy. The secessionists had taken the light ship which was formerly on Frying-Pan Shoals and anchored her close to the fort, where she served as a beacon for vessels going in and out of the harbor. Captain Glisson, of the steamer *Mount Vernon*, determined, if possible, to destroy her. An expedition was planned to go in and set fire to the light ship. A volunteer force set out on the 30th of December, under cover of night, and pulled quietly close up to the ship. Luckily a rope was found hanging over the quarter, by the aid of which one of the officers climbed on board. The vessel was found deserted, but there were evidences of carpenters havbeen recently employed in putting up berths and cutting gun ports. The vessel was pierced for eight gun, and everything was nearly ready for mounting the battery. Combustibles were gathered, and after being well saturated with turpentine the pile was fired, and before any assistance could be brought to the ship the Confederates saw their new-fangled war steamer burn to the water's edge.

Congress has recently passed an act authorizing the appointment of two additional Secretaries of War, at a salary of $3,000. Secretary Stanton has signalized his entrance upon his duties by a most judicious use of the appointing power. These places have been filled by the appointment of P. H. Watson, Esq., of Washington, and John Tucker, Esq., of Philadelphia, President of the Reading Railroad, who is said to be a thorough-going business man. We are able to speak of Mr. Watson from long personal knowledge, and we hesitate not to say that he will fulfill his appointment ably and acceptably. Mr. Watson began business in Washington some years ago as a Solicitor of Patents, and is now considered one of tbe ablest patent lawers in the country. He is altogether a sterling man, and will make a laborious, pains-taking officer.

Ex-President John Tyler, of Virginia, died on the 17th ult. He closed his career in rebellion against the government.

Salt in Kansas.

The extreme high price of salt makes the present a favorable time for engaging in the manufacture of this article, and the improvement of the numerous saline springs which are known to exist in Western Kansas and Nebraska. We learn that a gentleman residing in Jefferson County recently made a trip to Salt Creek, in Nebraska Territory, about 150 miles from here, where, in eight days, he manufactured eight barrels of pure salt, worth here from seventy-five to one hundred dollars. If a single individual, without any of the usual appliances for the manufacture, could do this, how much better might a company do, properly organized and equipped for the business. Salt is now selling here at six cents per pound, and will probably not be much if any lower, during the continuance of the war. At that price, an interest in a good salt spring becomes at once a handsome investment, if not a fortune. Besides those on Salt Creek, there are five springs along the Saline Fork of the Kansas river, not more than one hundred and fifty miles from this place.

We hope capitalists will take hold of this matter, for the sake of ensuring a supply of this indispensable article, which is now threatened to be cut off, and for the development of this resource of the country, as well as for the money there appears to be in it.

The country along the Saline and Smoky Hill Fork is also well supplied with coal, iron and marble, in addition to the unusual fertility of its soil, and beauty of its landscape, and a movement for the establishment of factories there could not but result in the concentration of very heavy settlements, and the demonstration of the existence there of all the great elements of a rich and prosperous community, to an extent unequaled elsewhere in the West.—*Kansas Record.*

Our Feeling Toward England.

The course which England has taken in regard to the present rebellion has produced a very deep impression on the minds of the people of the free States. We have long cherished a friendly feeling towards her, and have shown it in a great variety of ways. During the Irish famine we sent their people corn liberally. When Sir John Franklin was lost in the Polar sea, we sent out a ship to search for him. When we found one of their deserted exploring ships, and rescued it from the ice, we returned it to England. When their prince visited the Northern States, evidences of our friendship toward the people and the royal family of England were lavished upon him and his party. These are but a few among many specimens of what we have done to manifest our good feeling toward them. Yet from the very first, the rebels have received their chief encouragement and aid from England. English commerce and the English press have been mainly on their side. English capitalists take this opportunity to slander our credit, in the hope of breaking us down. Influential Englishmen not only utter loud predictions of the dissolution of the Union, but shamelessly avow their wish that it may be broken up, so as to destroy our rivalry with England.

But worse than all this is the course of the English government. Not many years since, they were manufacturing muskets by hand labor, and knew of no other way. They learnt through their agent who visited the Crystal Palace at New York, and made a visit to Springfield, that we had invented machinery for manufacturing arms; and actually made them so that their parts would interchange. When this was communicated to Parliament it was treated as an absurdity. The possibility of making the irregular parts of a gun by machinery was denied; and it was not without fierce opposition that a small sum was appropriated for making further inquiry. Commissioners were appointed who came to Springfield while Gen. Ripley was superintendent. By the consent of our government, he allowed them to inspect all our machinery; and they were able to send home a report that the wonderful accounts they had received were true. They were then permitted to make contracts with the Ames Company at Chicopee and other establishments for the manufacture of similar machinery, and to take drawings and models from the armory. Similar machinery did not exist elsewhere in the world, and without this kindness of our government, they would to this day have been making muskets by hand. Much of the machinery had been invented in Springfield, and was very complicated, and could not have been made without aid from our government. When the machinery was made, they were allowed to hire from the armory such men as they chose, to go to England and set up the machinery and superintend its operation. Some of these men are there now. At their new arsenal at Enfield Locks, they are said to be making two hundred thousand muskets a year. For this they are indebted to our kindness. They now repay this kindness by forbidding the export of arms, saltpeter and lead to this country, and by seizing all they can find in the hands of our merchants, although it has been bought of their people and paid for. This is British reciprocation of friendship and kindness.

[The above extract is copied from the Springfield *Republican*. It sets forth facts which we are glad to see brought forward at this time.—Eds.

About Knapsacks.

Within the last month, 200,000 knapsacks have been delivered to the government in addition to previous purchases of about 700,000 during the past eight months. The contracts for more than one-half of these knapsacks have been given to parties in this city, the remainder being distributed between Philadelphia, Wilmington, Del., and Newark, N.J. The contract price has ranged from $1 89 to $2 60, averaging about $2, so that the total expenditure for this single article of military equipment has been nearly two millions of dollars. A more substantial article, after the French and Prussian pattern, has been purchased for some regiments, at a cost of from $4 to $4 50. Ten thousand of them have been inported, and five thousand more manufactured by Edward Gumbs, of No 5 Murray street, in connnection with other contracts.

The manufacture of these knapsacks has given employment to the trunkmakers of this city at a time when the sales in their regular business were less than 20 per cent of ordinary years. It is estimated that some 12,000 operatives, male and female, have been kept at work in this way directly, while the industry of a large number of others has been incidentally affected. Brass founders, stair-rod makers, wire drawers and others, workers in metal, whose usual business is completely dead, have turned their attention to the manufacture of brass trimings for knapsacks, while a large number of others have found employment in furnishing the immense number of buckles and straps required. The demand for canvas, thread, paint, &c., has also stimulated trade in these articles, and not less than ten or fifteen thousand dollars have been expended for the single article of wax, with which the thread used in sewing is stiffened.

Before the present war, the government knapsacks were all made in Philadelphia, at the regular price of $2 72 each; but competition has reduced the price to an average of about $2, some contracts having been taken as low as $1 89. The large number of knapsacks called for shows that our soldiers are not as careful of them as they might be. A good knapsack ought to last two or three years, and even with such treatment as they ordinarily receive, at least a year. But many regiments not six months in the field, have had two sets already, and some after being supplied by the State, have obtained requisitions on the government for a new lot and thrown their old ones away, while still valuable for use.—*New York Sun.*

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THE CHEMISTRY OF COAL.

Number II.

DESTRUCTIVE DISTILLATION.

If water is heated to a temperature of 212° it passes into the form of gas or steam, and if the temperature of the steam is reduced below 212° it is restored to the liquid form. If water is boiled in a close vessel, and the steam is led off through a pipe and condensed so as to be collected in another vessel, the process is called distillation. By this process water may be separated from salt or any other non-volatile substance which it may hold in solution. The same process is also employed for separating alcohol from water. Alcohol is produced by fermentation, and the still is used merely to separate it from the water with which it is mixed. Alcohol boils at 173°, and consequently if the mixture is heated to this point the alcohol goes off as vapor into the worm, while the water remains behind. Neither water nor alcohol is decomposed by distillation. When in the form of vapor their atoms are composed of the same elementary atoms as when they are in the liquid form—water is still H O, and alcohol is C_2 H_3 O.

But there are other substances which, if heated sufficiently to evaporate or distil them, are decomposed. This is the case with coal. It cannot be evaporated and condensed again in the form of coal. The carbon, hydrogen, nitrogen, and oxygen, of which it is principally composed, are separated by distillation, and recombined to produce new substances. In such cases the process is called destructive distillation.

Anthracite coal cannot be distilled. It consists almost wholly of carbon and the inorganic elements, and these are neither volatile themselves, nor do they combine with each other to produce substances that are volatile. But bituminous coal contains a large quantity of oxygen, hydrogen and nitrogen, which combine with each other and with the carbon and inorganic elements of the ashes to produce a large number of volatile substances. The study of these products of the destructive distillation of coal will constitute the principal portion of our articles on this subject.

SURFACE CONDENSERS FOR STEAM ENGINES.

Number IV.

In the first condensers made by Mr. Hall, as illustrated in Fig. 5, the tubes were so secured in collars that provision was not made for the unequal expansion of the metal, consequently the tubes cracked. He then adopted the plan of securing only one end of the tube, and allowing the other end to work freely through a stuffing box, as shown by the tubes in diagrams 6 and 7. The apparatus on the right hand is to supply water lost through leakage. To regulate the supply of distilled water so as to maintain the water

Fig. 6

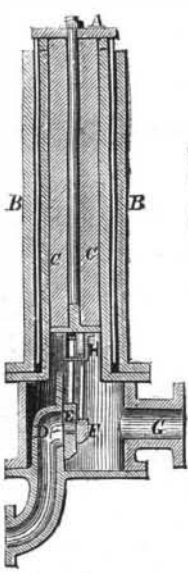
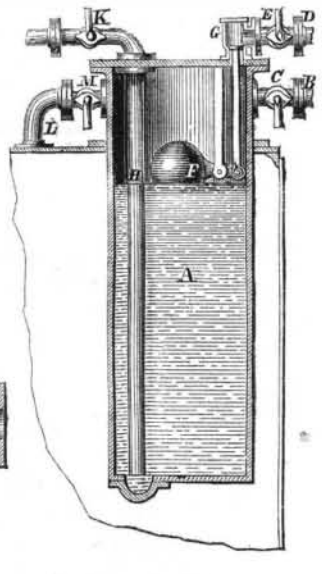
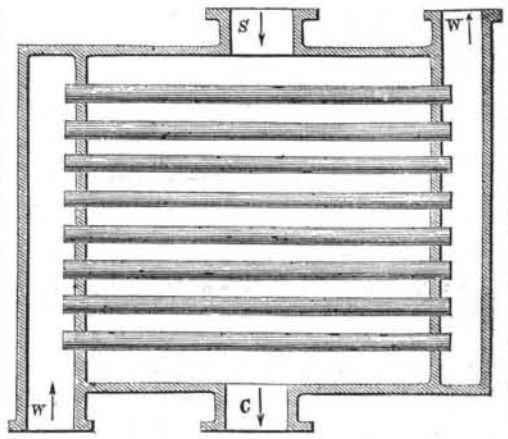


Fig. 7.



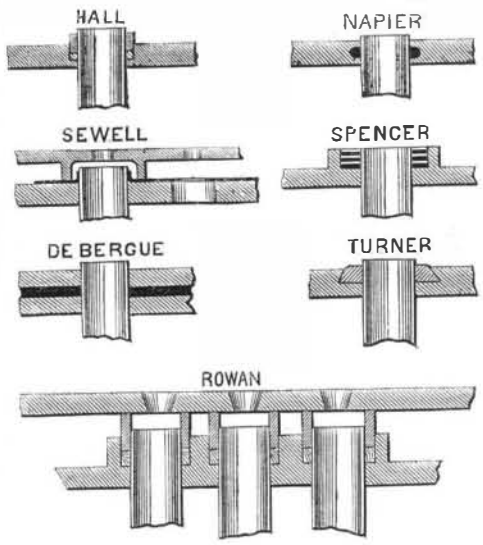
in the boiler at a proper hight a cock, C, is placed between the pipe, B, and the distilling vessel, A; by opening the cock, C, the steam from the distilling vessel is allowed to pass into the condenser, where it is condensed and passes, with the condensation water, into the boiler. When the proper level in the boiler is attained the cock, C, may be closed. The distilling vessel is connected with the cold-water cistern by the supply pipe, D, to which is fitted the cock, E, and the water is maintained at a proper hight in the distilling vessel during the distillation by means of the float, F, and valve, G. Any sediment may be blown off from the distilling vessel through the pipe, H, fitted with

Fig. 8.



the cock, K, by the pressure of the steam admitted through the pipe, L, and cock, M, thus, by shutting the cocks, C' and E, and opening K and M, the pressure of steam from the boiler, acting on the surface of the water in the distilling vessel, drives it out, with its impurities, through the pipe, H. The distilling vessel is let into the boiler, the steam in which supplies the required heat. Several plans have been used to effect this purpose, all acting more or less on this principle.

Fig. 9.



The left-hand figure of diagrams 6 and 7 represents Mr. Hall's steam saver, its office being to cause the steam which usually escapes at the safety valve to enter the condenser, so that the distilled water resulting from its condensation may be restored to the boiler by the action of the air pump, or any other suitable means. A is a cylindrical vessel closed at top, and the lower end plunged in mercury contained in a circular groove or cavity formed between two concentric cylinders, B B. These cylinders are supported upon a square box, which is closed at bottom and communicates with the boiler by the opening, C, and with the condenser by the bent pipe, D, to which latter is fitted a sliding valve, E, having a small aperture, over which slides a valve, F. The cylinder, A, is loaded by the weight suspended within it, to which is attached the frame, the stem of the valve, F, is attached to this frame, and the stem of the valve, E, works freely in a hole in the frame, and has a nut at the upper end, at a small distance above the lower bar of the frame.

Mr. David Napier, who was early in the field as an advocate of surface condensation, devised a plan which will be understood by referring to diagram 9. It consists of a number of horizontal tubes, in a wooden box open to the sea, and passing through a stuffing box in the tube plate, similar to that described as used by Hall, and at the other end forced through a ring of india rubber, previously inserted in a recess in the tube plate, as shown in diagram 9. In this instance the openings through the vessel's sides for supplying the condensing water were provided with flanges, so arranged that whichever way the vessel was moving a current of water was constantly flowing through the condenser. In this, which is a very simple and economical arrangement, we imagine the flow of condensing water would be hardly sufficient.

The plan adopted by Mr. Sewell, of New York, and introduced into England by Mr. Davison, has been extensively used in England with good results. It will be understood by referring to the same diagram, 8. It consists of a number of tubes placed horizontally, passing freely through holes in each tube plate, and projecting a short distance at each end over their ends, is passed a sheet of india rubber, punched with holes corresponding with the holes in the tube plate, and through the tubes are forced, thus forming an hydraulic cup joint. The india rubber is kept to the tube plates by a gland, which also serves to keep the tubes in place. The water is forced by means of a circulating pump, through the tubes in the direction of the arrows, W, diagram 8, and steam is admitted through the branch, S, the condensation water being drawn off through the branch, C. In this condenser the tubes are very easily withdrawn for cleaning or renewal, and it is a cheap and efficient condenser.

Mr. Spencer's condenser, which has been somewhat extensively used, and with good results, is similar to Sewell's, with the exception of the packing, which is shown in diagram, consisting of one or more india-rubber rings passed over the ends of the tubes, and driven firmly into recesses provided in the tube plate.

The expansion of the tubes has been provided for in many other ways by different inventors. The plan recommended by De Bergue, represented in diagram, consists of two tube plates, with a sheet of india rubber between them, with holes corresponding with the holes in the tube poles. When the tubes are in their places the two plates are screwed together, thus expanding the india rubber latterly, and making a firm and tight joint.

Another plan, proposed and adopted with success by Mr. Turner, consists of melting into a recess around the tube tin or other soft metal, which is afterward caulked. It forms a tight joint, allowing the tube to expand, and can, if necessary, be very easily re-caulked.

Warlike Enterprise.

The Emperor Napoleon remarked at St. Helena:—"Generals are rarely found eager to give battle; they choose their positions, establish themselves, consider their combinations, but then commences their indecision; nothing is so difficult and at the same time so important as to know when to decide."

Wellington said:—"The fault with most commanders, however brave, is backwardness in taking the last step to bring on a battle, especially when armies are large; arising from deep moral anxieties, and after all, the uncertainties of the issue."

Washington, in a letter to Congress in 1780, expressly speaks of "our security depending on want of enterprise in the enemy," and says that "we have been indebted for our safety during a greater part of the war to their inactivity."

DIPHTHERIA.—We notice this insidious disease is becoming quite prevalent in some parts of the country. It is a malady that if not arrested at its very outset is almost certain to prove fatal. As soon as the first symptoms appear a physician should be instantly summoned. Meantime, until the doctor arrives, temporary relief can be afforded by gargling the throat every ten minutes with a strong decoction of common salt and water. Make it as strong as the patient can endure it without strangling, say, a teaspoon full of salt to two tablespoon's full of water. In many instances this simple remedy has been known to entirely check the disease without the aid of any further prescription.

NEW PROPELLER.—E. B. Ward, Esq., of Detroit, has a new boat in process of construction, which will be propelled on a principle unlike anything ever seen on the Western waters. She will be what is called a beam-geared propeller, with an engine working athwart ships, every stroke of which will produce two and a half revolutions of the wheel. The new boat will have 187 feet keel and 24 feet beam. The engine is being built at the Detroit Locomotive Works.

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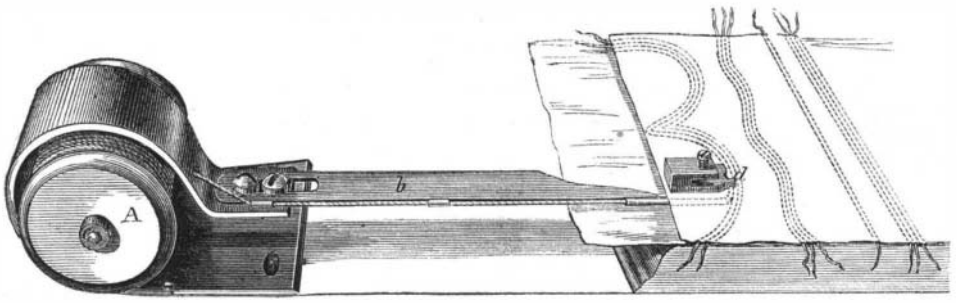
Corder for Sewing Machines.

The accompanying engraving represents a little attachment which may be applied to any sewing machine in use, in cording fabrics. The spool, A, containing the cord is slipped upon the axle, *c*, and the cord is led through the loops upon the spring blade, *b*, to the point, *d*, and through the groove in the toe piece of the shoe. It is here received between the two sheets of fabric, which pass under the shoe, and stitched without previous basting. The cord may be inserted in straight, curved or waving lines, and in such manner as to bring all the fullness produced by the cord on one side of the fabric, leaving the other side perfectly flat.



BRADY'S CORDER FOR SEWING MACHINES.

The right to use this invention has been sold to some of the leading sewing machine manufacturers, and the inventor is desirous of selling it to others. The patent was granted Dec. 27, 1859, and further information in relation to the matter may be had by addressing the inventor, O. G. Brady, at 440 Broadway, New York. See advertisement on another page.

Vulcanizing India Rubber—Influence of Occupation Upon Health.

The following extracts on this important subject, are from the Paris correspondent of the London *Lancet*:—

None of the most arduous callings in life can be exercised without a measure of wear and tear in the human machine. In no way can the destructibility of the working material with which we men are provided be better seen than by a consideration of the special diseases which the exercise of particular professions entails upon their adepts. The statesman, clergyman and lawyer have their especial sore throat, the doctor his dissecting wound, the knife-grinder his phthisis, the painter his colic, the lucifer-match maker his necrosis, the chimney-sweeper his cancer; and so on through a long chapter of accidents, ending only, it would appear, with the last item on the catalogue of professions. In presence of this almost daily increase of morbific causes, it behooves medical science, as the sentinel of civilization, to be more than ever on the alert, to check the hurtful progress of new diseases Such is the object of a paper read at the Paris Academy of Medicine, by M. Delpech. Some few years back, this writer, in a communication to the Academy, first drew notice to the baneful effects produced by the sulphuret of carbon upon the workmen employed in the preparation of vulcanized India-rubber. The process termed "vulcanizing" is effected by the exposure of caoutchouc to the action of a mixture of sulphuret of carbon with chloride or bromide of sulphur; and, according to M. Delpech, the respiration of air charged with the vapor given off during the operation produces, in a large proportion of the workmen so engaged, symptoms not unlike those resulting from the inhalation of ether, chloroform, or other anæsthetic agent, with the difference that in the former case the effects are more gradually developed. The particular branch of the India-rubber manufacture whence the author has gleaned his most prominent facts, is that in which the caoutchouc is blown into bags or bladders for medical and other purposes; and here he has divided the symptoms of intoxication into two stages. In the first are ranged headache, giddiness, cutaneous hyperæsthesis, with feelings of creeping or pricking, and muscular pains. A certain degree of excitement and agitation also is not uncommon, together with a tendency to laugh or cry without reason; and with these half-hysterical symptoms may coexist sleeplessness, night-mare, and great irritability of temper, sometimes ending in confirmed mental alienation as a climax. In other cases the stimulus has affected the muscular system, in the way of spasm or stiffness; or, again, the digestive or respiratory organs, by the production of bulimy, nausea, cough and oppression; and, lastly, the heart and circulation, in the way of fever and palpitation. In the second stage, the poison would seem almost exclusively to have impaired the functions of the nervous system, as exhibited by decline of the intellectual powers, melancholy, indifference, loss of memory, defective vision, deafness and insensibility of the skin, together with loss of sexual power, atrophy of the seminal glands, general muscular debility, going on to paraplegia, wasting and cachexia. By means of experiments on animals, M. Delpech has ascertained that rabbits, for example, although easily affected by the vapors of the vulcanizing mixture, or by those of the sulphuret of carbon alone, passed several days with impunity in an atmosphere charged with chloride of sulphur, and he therefore argues, with much apparent fairness, that the former ingredient alone is responsible for the baneful effects resulting from the process. By way of practical deduction, he infers that if the workpeople could be so placed, when manipulating these poisonous materials, that a glass screen should intervene between them and the caoutchouc under preparation, their arms being passed through apertures properly stuffed in order to prevent the entry of vapor, much benefit would accrue, in a hygienic point of view, to the employees in this branch of trade.

HEARING TRUMPETS.

Hearing trumpets formed of vulcanized india rubber and made to fasten on a suitable cap, as represented in the annexed figure, might be used by military scouts for the purpose of detecting distant sounds unappreciable by the naked ear. It is of great importance to detect military movements made during night; hence soldiers who are quick in hearing should always be chosen to perform picket duty during hours of darkness, when sudden attacks or secret movements of the foe are expected. It is well known that some animals, such as dogs, can hear distant sounds when the human ear is at fault; it was therefore customary for Roman soldiers on guard in an enemy's country, to use a watchdog that was quick of ear so as to give warning when a foe was approaching with stealthy footsteps. It does not appear unreasonable that art may enable men to rival the most sensitive-hearing creature by such a device as is here represented.

CHLORINE AS A DISINFECTANT.

Of that class of disinfectants which remove odors by destroying them by far the most powerful is chlorine. Nearly all the offensive odors that we encounter are organic compounds, generally containing hydrogen. Chlorine has a very strong affinity for hydrogen; so strong that when chlorine comes in contact with a compound of hydrogen, nitrogen, carbon or oxygen, the hydrogen leaves the other elements and combines with the chlorine; and the compound is thus broken up.

Some of the compounds of chlorine are even more powerful as disinfectants than the element alone. One of these is hypochlorous acid, which is a compound of one equivalent of chlorine with one of oxygen, Cl. O. The substance popularly but improperly known as the chloride of lime is in fact the hypochlorite of lime; being formed by the combination of hypochlorous acid and lime. This is one of the most powerful disinfectants known. It generally destroys odors by oxydizing them, giving up its own oxygen to the organic compound and burning the latter up. Chlorine is exceedingly injurious to the lungs, and therefore should never be used in inhabited apartments.

THE Naumkeag Mill, in Salem, is about importing a load of cotton from India, to supply the place of American cotton sold.

Suggestions How to Prevent Fires.

The Philadelpia *Ledger* publishes a number of suggestions in regard to the prevention of fires, which we commend to the attention of housekeepers, tradesmen, manufacturers and others. They are as follows:—Keep matches in metal boxes, and out of the reach of children. Wax matches are partiularly dangerous, and should be kept out of the way of rats or mice. Be careful in making fires with shavings and other light kindling. Do not deposit coal or wood ashes in a wooden vessel, and be sure burning cinders are extinguished before they are deposited. Never put fire wood upon the stove to dry. Never put ashes or a light under a staircase. Fill fluid or camphene lamps only by daylight, and never near a fire or light. Do not leave a candle burning upon the steps of a stairway. Never leave a candle burning on a bureau or a chest. Alway be cautious in extinguishing matches and other lighters before throwing them away.—Never throw a cigar stump upon the floor or into a spit box containing sawdust or trash, without being certain that it contains no fire. After blowing out a candle, never put it away on a shelf or anywhere else, until sure that the snuff has gone entirely out.

A lighted candle ought not to be stuck up against a frame wall, or placed upon any portion of the wood work in a stable, manufactory, shop, or any other place. Never enter a barn or a stable at night, with an uncovered light. Ostlers should never smoke about stables. Never take an open light to examine a gas meter. Do not put gas or other lights near curtains. Never take a light into a closet. Do not read in bed either by candle or lamp light. Place glass shades over gas lights in show windows, and do not crowd goods too close to them. No smoking should ever be permitted in warehouses, especially where goods are packed or cotton is stored The principal register of a furnace should always be fastened open. Stovepipes should be at least four inches from wood work and well guarded by tin. Rags ought never to be stuffed into stovepipe holes. Openings in chimney-flues for stovepipes which are not used, ought always to be securely protected by metallic coverings. Never close up a place of business in the evening without looking well to the extinguishment of lights and the proper security of the fires. When retiring to bed at night, always see that there is no danger from your fires, and be sure that the lights are safe. This is the season of the year when fires are indispensable everywhere, and when the short days and long nights render it necessary to burn lights for many bours. The above suggestions, if carefully followed, may be the means of preventing numerous fires, and thereby saving thousands of dollars' worth of property, as well as preserving many valuable lives.

Those who Live in Glass Houses Should not Throw Stones.

We find in the *Irish Agricultural Review* the following communication from Capt. Norton, the well-known inventor of war projectiles:—

Captain Rodman, of the United States Navy, casts cannon ready boxed by the act of casting in the same manner as my patented process; he, however, cools his cannon from within. This is an improvement on my patent. The SCIENTIFIC AMERICAN of a late date describes the construction of the *Ericsson*, a steel-clad floating battery for the defence of the harbor of New York. The sides of this battery could not be pierced by shot fired by a cannon in our service; but a shot fired from the 15-inch bore guns cast on the Rodman principle would crush in the sides of our steel-clad *Warrior* when fired at the distance that Nelson loved to pour in his broadsides. How would Brighton, with its princely buildings, look after a few rounds of Rodman's shells, having my concussion-fuzes fixed in them, were thrown into it from a distance of three or four miles? Dublin is in the same danger, as well as many towns on the coast of England, Ireland, and Scotland. Shells can now be charged with liquid fire (phosphorus dissolved in bisulphite of carbon), the most "rarefragious" fire stuff ever invented by the ingenuity of man. Captain Halsted, R. N., one of our very best authorities on naval armaments, has clearly stated that one shell, charged with liquid fire, is sufficient to destroy the largest line-of-battle ship. Is it good play, then, for the *Times* newspaper to taunt the Northern Americans with the Bull's Run reverse when these Americans can retort the historical quotation, "Why did you run at Fontenoy, ye scoundrel grenadiers?"

ANIMAL and vegetable life exists in the sea at a depth of 2,500 yards.

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Correspondence

Traveling and Gravitation.

MESSRS. EDITORS:—Several attempts to reach the North Pole have been made; but the nearest approach to that point appears to have been made by Captain Parry, who penetrated as far as 82° 45′. One great obstacle in the way of reaching the pole is the severity of the northern climate, but there may be another which apparently is not thought of, viz., the greater force of gravity which possibly exists in the Polar regions. The centrifugal force which bodies acquire by the revolution of the earth around its axis is supposed to counteract or lessen the force of gravity. This centrifugal force is very small near the poles, but increases from the poles to the equator, where it is the greatest. If, therefore, a traveler whose weight at the equator is 150 lbs should have a gravity of 300 lbs in the Polar circle, he would find Arctic traveling very fatiguing. It is somewhat curious that all Arctic travelers complain of being very weak and easily fatigued in the Polar regions. Is this weakness owing to the increased gravity?

If there is a difference in the power of gravity in different latitudes, it is obvious that it could not be detected by ordinary scales, as the balance would be affected equally at each end; but by using spring scales the difference, if any, could be ascertained. If it is true that objects on the earth do weigh more the more remote they are from the equator, a curious way of ascertaining the latitude will be discovered.

But there can be no great difference in any part of the Torrid Zone, because objects move in nearly as great a circle in any part of that zone as at the equator. In latitude 40, perhaps about one quarter of the centrifugal force is lost; in lat. 60, one-half; and at the pole the centrifugal force is as it were entirely done away with. J. B. P.

Pittsfield, Mass., Jan. 20, 1862.

[We recognize among our correspondents two classes of intellects, one having clear and distinct ideas, while the notions of the other are a mass of confusion. The letters of the latter class generally contain denials of some of the best established facts of nature or some of the most obvious principles of philosophy—asserting, for instance, that we live in the inside of the planets, or that the tides are not caused by the gravitation of the moon. On the other hand, the contributions of the clear-headed men always state distinctly some fact which they have actually observed, or some principle which they plainly perceive. It usually proves on investigation, that the discoveries of these men have previously been made by others. The above communication is from a man of remarkably clear intellect, and a truth of nature has occurred originally to his mind. But it so happens that the same idea occurred to the minds of others a long time ago, and it has been very thoroughly investigated by some of the most careful experimenters that ever lived.

The force of gravity is diminished so little by the centrifugal force of the earth's rotation that it could not well be measured by a spring balance, but it has been ascertained by means of delicate pendulums. It is nearly equal to the $\frac{1}{289}$th part of the force of gravity, by the square of the cosine of the latitude. It is also diminished in the same proportion by the elliptic figure of the earth, bodies near the equator being removed farther from the center of the earth. Hence, from these two causes the diminution of gravity from the pole to the equator is equal to 0.00694 multiplied by the square of the cosine of the latitude, the force of gravity at the equator being taken as unity.—EDS.

Railroad Crossings—Attention, Superintendents.

MESSRS. EDITORS:—It would be a good plan for railroad companies to paint, in large letters, on the boards at "crossings" the times when trains pass, so that persons might "look out for the engine. Such an arrangement would be peculiarly useful on curves where trains cannot be seen until they are actually on the crossings. The noise of an approaching train is frequently not heard by persons riding in wagons, owing to a strong wind carrying the sound away in a contrary direction. J. S. WALKER.

Management of Anthracite Fire.

MESSRS. EDITORS:—You open your columns for the convenience and general good of the community, and I take the liberty of giving a leaf of my own experience in the burning of hard coal. Much patience and much coal were wasted, and considerable suffering came upon all the family from not understanding a simple principle connected with this kind of coal. It is this:—It must be heated throughout before it will burn. I do not propose to go into the philosophy of the thing; any one who chooses may investigate that. But the fact is of consequence to every household where this kind of coal is burned; and the knowledge of it will be an advantage to every person who has charge of fires made with it. We all know that a piece of charcoal will ignite and continue burning at one end while we hold the other in our hand; and one may carry a shingle flaming at one end; but anthracite coal gets too hot to hold long before it is red.

Now for the application:—Do not get impatient with your new made fire, and keep stirring it. That hinders the coal from heating through. In the morning, if you have in your stove some live coal and much hot ashes, do not dump it, shake it up, nor "poke" it, but pour on a quart or two of coal, open the drafts, and be patient. When this upper coal has got hot and begins to burn, then is the time to clear the stove.

Try this simple plan, my friend, with the stove that you are just now so much displeased with. Apply this fact as your excellent common sense shall dictate, and I think you will admit that, like many other very simple things, it is the secret of much comfort. W.

[The philosophy of this was explained on page 26, of our current volume; but our correspondent probably had not received that number when he wrote his communication.—EDS.

The Simple Barometer.

MESSRS. EDITORS:—Observing in the SCIENTIFIC AMERICAN of January 18, a plan for constructing a simple barometer, I set about making one according to the directions; but while doing so an idea struck me as to whether such an instrument could be at all reliable as a weather indicator, on account of its liability to be affected by the changes of temperature of the surrounding atmosphere. It seems plain to me that the one cylinder being air tight the weight of the air therein will always remain the same; whereas the other cylinder being open to the external air, if the temperature rises it will cause the contained air to expand and expel a portion of it, thus rendering the cylinder lighter than the other, which will of course depress the balance and cause the lighter one to ascend. I do not know whether I am right or not in my supposition and would like to know your opinion on the subject. A. P.

[The barometer described, is not a very good one, as its action depends upon the buoying power of the air, which is just proportioned to its density, and is not necessarily in exact proportion to the weight of the vertical column, which it is the office of a barometer to measure. As our correspondent suggests, temperature would affect the density of the air more than the quantity of aqueous vapor would; and thus this instrument would act as a thermometer.—EDS.

The Motion of Cannon Balls.

MESSRS EDITORS:—I noticed in the SCIENTIFIC AMERICAN of Jan. 4 an assertion by H. W. B., of New York, that if a cannon were placed on a railroad car, pointing backward, and fired with a charge of powder which will impart a velocity to the ball just equal to the velocity of the car, the ball would fall vertically to the earth.

Query—If the position of the cannon were inverted and pointed forward, with a charge of powder sufficient to force the ball with the same velocity with which the car is moving, what would be the result?

Query—Would not the cannon recoil so that the ball would fall vertically to the ground?

Query—If the cannon were confined so that it could not recoil, what would be the result? J. W. M.

Searsport, Jan. 13, 1862.

[All motion is relative. There is no matter in the universe at rest. When a cannon is at rest in relation to the earth, it is in fact being swept along by the revolution of the earth on its axis, the velocity in this latitude being just about equal to that of a cannon ball. So that if a cannon is fired in a direction exactly west, the ball is simply stopped in its motion, and the target, fort, or whatever it is fired at is brought up against it. If, on the other hand, it is fired directly east, its motion is doubled.

The same principles apply to a cannon carried along upon a railroad car. Its motions in relation to the car will all be the same as if the car were at rest; and of course its motion in relation to other things will be modified by the motion of the car. If the recoil of the cannon is prevented, the reactive force of the gunpowder is expended in producing other effects than the motion of the gun—in altering the form of the gun, in crushing the material behind it, &c. The less the recoil, however, the greater is the velocity imparted to the ball.—EDS.

Rice Hullers Wanted in Mexico.

MESSRS. EDITORS:—I have been a constant reader of your valuable paper for more than twelve years, first in Ohio, next in Louisiana, and then for nine years in California, and now in this distracted country. During all my multifarious peregrinations your journal has accompanied me. For over two years I paid half a dollar a number for it, being express prices. I have paid over one hundred dollars freight on what I now have, for I would as soon think of leaving one of my family as to leave these volumes of your paper.

I would like to write you a long letter about this region and the production peculiar to it, but I forbear at present. One thing we have here in abundance, it is the india rubber tree. Now, I come to the gist of this letter in a few words. There is any quantity of rice grown here, and there is not a rice hulling machine in the State (Colima, capital similar name). It costs two dollars to hull and clean 300 lbs. of rice, and then it is done in a very imperfect manner. Now, I wish you to let me know either by letter or in the column of "Notes and Queries," what the price of a good rice-hulling machine will be; also how many bushels it will hull in a day, and the weight of such a machine. I am much interested in the above business, and will ever consider myself your debtor should you oblige me in this. Address H. B. Davison, M.D., Colima, Mexico, (care of U. S. Consul, Manzanilla.)

Platt and Rosecrans's Lamp.

MESSRS EDITORS:—I have received a copy of the SCIENTIFC AMERICAN, containing your notice and illustration of the lamp, and find it all right except in one particular, which, if not corrected, is destined to do us much injury, and was doubtless an oversight on your part.

The whole gist of this invention consists in the reduction of the length of the chimney, and it is to this point that our labors have been mainly directed. We have tested every imaginable form of chimney, and all lengths, from one inch to six, rising by eighths, and have fully satisfied ourselves in this way that a chimney 2½ inches long above the ends of the tubes works better for this structure than either a higher or lower one, and have therefore fixed upon this as the regular hight of chimney, not counting what falls below the ends of the tubes, as it does not add to the elevation of the chimney, but only serves to expose the flames to run. A. H. PLATT.

[We gave the length of the chimney from a careful measurement of the sample sent us. Articles sent to the SCIENTIFC AMERICAN should be like the offerings of the Jews—"without blemish."

Cost of the Great Exhibition Building.

MESSRS. EDITORS:—It is stated in the article on the Great Exhibition building which appeared in the SCIENTIFIC AMERICAN of January 18th, that "the entire cost is to be $1,000,000." This is a mistake. The amount the contractors of the building are to receive is contingent on the receipts of the exhibition. Her Majesty's Commissioners have the option of purchasing the building out and out or of merely paying for the use of it. For the rent of the building a sum of $1,000,000 is guaranteed absolutely; if the receipts exceed $2,000,000 the contractors are to be paid $500,000 more for rent, and they are bound, if required, to sell the whole for a further sum of $650,000, thus making its total cost $2,150,000, and not $1,000,000, as stated in the SCIENTIFIC AMERICAN.

E. NUGENT,
Brooklyn, N. Y. Member of the Society of Arts.

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HISTORICAL AND SCIENTIFIC FACTS ABOUT PETROLEUM.

Within the last three years there has sprung up in this country an important and extensive branch of industry—the refining of petroleum, or, as it is sometimes called a mineral oil. This is already a staple article, and its use as an illuminator, is becoming every day more extended. When properly manufactured it is not explosive, it affords a brilliant flame, it can be furnished at a moderate price, and, moreover, its sources of supply in this country are abundant. The subject is one of so much general interest that we are induced to publish the following interesting article concerning this substance, which was sent to us by a member of the Chemical Society of Schenectady, N. Y :—

Petroleum is not of constant composition, but is a variable mixture of numerous liquid hydro-carbons, as benzole, naphtha, kerosolene, &c., with paraffine, naphthaline and asphaltum, solid hydrocarbons. It is of a very dark green color, and in density varies from a thin fluid, lighter than water, to a thick viscous liquid, heavier than water. The lighter qualities yield the larger proportion of burning oil.

The evidence of the most ancient occurrence of petroleum is among the ruins of Ninevah, whose existence dates back more than two thousand years before the Christian era. In the construction of this city, an asphaltic mortar was extensively employed, the asphlatum being obtained by the evaporation of petroleum.

A later mention is found in the accounts of Babylon, whose walls were cemented with asphaltum, which was poured, in a melted state, between the blocks of stone, and an indestructible mortar thus secured. This asphaltum was procured from the fountains of Is, which were about one hundred and twenty miles above Babylon, on the Euphrates. Together with saline and sulphurous water, it issued from a rock and was conducted into large pits. The oily matter was then skimmed off and solidified by atmospheric evaporation. These springs, from the abundance of their products, attracted the attention of Alexander, Trajan and Julian, and even at the present time, asphaltum, procured from them, is sold in the neighboring village of Hits.

From time immemorial asphaltum has been found on the shores of the Dead Sea, and this is one of the most remarkable localities for it. This sea, as is well known, is of supposed volcanic origin; and is the probable site of the ancient cities of Sodom and Gomorrah. Its surface is thirteen hundred feet below the surface of the ocean, and it has been fathomed to the depth of two thousand feet. In several places no bottom has been reached, and, owing to internal convulsions, the depth changes from time to time. The water is very dense, holding in solution twenty-five per cent of solid matter, of which seven per cent is salt. The bituminous substance is up-thrown from below and toward the center of the sea it is found in a liquid state, like petroleum; but it is probably solidified by evaporation, as it appears upon the shores in hard compact masses. The explanation of this phenomenon is that a connection between the sea and some internal volcano exists, whence this substance is ejected.

In the vicinity of the Caspian, the Bakoo springs have yielded large quantities of oil, and are widely celebrated. Some of the Persian wells have furnished fifteen hundred barrels a day, and throughout this region this material, under the name of Naphtha, is very generally burnt for its light.

At Rangoon, in Burmah, petroleum has been obtained for many years, and at this time there are over five hundred wells, which annually afford four hundred thousand hogsheads. The oil occurs in a strata of blue clay; wells about sixty feet deep are dug, into which the petroleum oozes. This is sometimes used in its natural state, but more frequently it is first purified by distillation with steam. The raw material is also mixed with earth and used as fuel.

In Europe there are few abundant springs. On one of the Ionian Islands there is an oil fountain which has flowed for over two thousand years; and the oracular fires of ancient Greece have been attributed to similar sources. Oil springs also occur in Bavaria, in the Grand Duchy of Modena, at Neufchatel, at Clermont and Gabian in France, and near Amiano in Italy. Petroleum procured from the last-named locality is used for lighting the city of Genoa but elsewhere in Europe it is not employed, to any extent, as an illuminator.

On this side of the ocean, there is an enormous quantity of this substance. Upon the island of Trinidad, one of the West Indies, at a distance of three fourths of a mile from the sea, is a lake of asphaltum three miles in circumference. Near the banks the asphaltum is hard and cold, but as you approach the center the softness and the temperature increase, until finally it is liquid and boiling. From the bubbling mass proceeds a strong, sulphurous odor, which is perceptible at a distance of ten miles. Between the banks of the lake and the shore of the island is an elevated tract of land, covered with hardened asphaltum, upon which vegetation flourishes. The explanation put forward in connection with the Dead Sea, is equally applicable in this case.

Upon others of the West Indies, petroleum has been obtained, as well as at several places in Central and South America; but it is in the northern portion of this continent that the abundant reservoirs of this substance are located; and it seems truly wonderful that their extent and richness should not have been discovered at an earlier period. For many years the Seneca Indians collected petroleum and, under the name of Seneca oil, sold it as a remedy for rheumatic complaints. At numerons places in the Middle States, it was found in salt borings, and was collected and burnt by the farmers, but it was not till August, 1859, that it was obtained in noticeable quantities. At this time oil was "struck" upon Oil Creek, Venango County, Pennsylvania, by sinking an artesian well to the depth of seventy feet, and for many weeks a thousand gallons a day were pumped from it. The news of this discovery spread far and wide, and gave rise to an "oil fever." Thousands flocked to this vicinity, in the hope of making their fortune. Before the close of 1860 there had been over a thousand wells bored, many of which were productive, but a large proportion returned nothing. Some of the adventurers have been very successful, and have made large amounts of money; but, as in all commercial "fevers," a large number of persons have been utterly impoverished by their speculations. The mere sinking a well by no means insures a bountiful flow of oil. The petroleum is stored in fissures formed by the upheaving of the earth's crust by volcanic action; and these fissures are perpendicular rather than horizontal in tendency, as is proved by the fact that at wells, but a few rods apart, the oil is "struck" at very different depths. The lowest parts of the fissures contain water, above which is the oil while in the highest portion there is a quantity of gas. If, therefore, the well strikes the fissure at the lowest part, the water will be forced up by the pressure of the supernatant oil and gas. Persons ignorant of the formation sink a well at random, and perhaps strike a fissure; but obtaining nothing but water, they abandon the spot as worthless, whereas after removing the water by pumping a large quantity of oil might be obtained.

In some localities in Ohio, as in the case in Burmah, the ground is saturated with the oil, and wells several feet in diameter are dug, into which the oil oozes. Porous limestone, containing petroleum, is found in some sections of the West, and has been subjected to distillation with profitable results.

In regard to the origin of petroleum, scientific authorities differ; but the theory most generally favored is, that it is the product of the slow distillation, at low temperatures, of organic matter in the interior of the earth; the vapors being condensed in the previously-mentioned fissures and the surrounding soil. The lake of Trinidad and the bituminous matter of the Dead Sea may also be referred to a similar source. But for how many centuries must this operation have been going on to have effected such enormous results?

Of the many uses to which petroleum and its derivatives are applied, that of illumination is the most important; and the process of refining is exceedingly simple. The crude material is put into a large iron retort, connected with a coil of iron pipes, surrounded by cold water, called the condenser. Heat is applied to the retort, and from the open extremity of the condenser, a light colored liquid of a strong odor soon flows. This is naphtha, and is very volatile and very explosive. Some refiners mix it with the burning oil, and numerous accidents have resulted from such mercenary indiscretion. It is usually run into a separate tank. After the naphtha has passed over, the oil used for illumination distills off. Steam is now forced into the retort and the heavy lubricating oil driven over. There now remains a black, oily, tarry matter, sometimes used to grease heavy machinery, and a black coke, employed as fuel. There are, therefore, five substances separated in this operation, but only the first three are of any economic importance.

The naphtha is used as a substitute for turpentine in paints, or by repeated distillations the benzole is separated from it and employed to remove spots from fabrics. This, however, is rather a drug in the hands of the refiner.

The burning oil, as it comes from the retort, is of a yellow color, and in order to remove this, it is placed in a large lead-lined cistern, and agitated with about ten per cent of sulphuric acid. After the acid and the impurities have subsided, the oil is drawn off into another tank and agitated with four per cent of soda lye. This last operation is to remove any acid remaining with the oil, and also to extract the residue of the coloring matter. In fact it is sometimes employed alone and a very good oil obtained. The oil is now agitated with water to remove the soda lye, and is then ready for consumption. The colorless oil is by no means the most economical, but on the contrary more light is obtained from the yellow article.

The heavy oil is cooled down to 30° Fah. when the Paraffine crystallizes out, and is separated from the oil by pressing. It is further purified by another pressing and by alternate agitation, in a melted state with sulphuric acid and soda lye. It is then molded into candles. It is a curious fact that the composition of paraffine and good coal gas is exactly the same.

In Egypt a substance derived from petroleum was used in embalming bodies; and in Persia and the neighboring countries asphaltum is used to cover the roofs of the houses and to coat the boats. In France asphaltic pavements have been successful in several cities, and for the protection of stone no material is better adapted. Mixed with grease the Trinidad asphaltum is applied to the sides of vessels, to prevent the borings of the teredo, and with quicklime it affords an excellent disinfectant. Among the products of the distillation of petroleum are naphthaline and kerosolene. The former is the substance from which is obtained aniline, the base of the beautiful colors, mauve, magenta and solferino. The latter has been proposed as a substitute for chloroform and ether. Many other substances have been separated, but as yet none of them have been applied. As this is comparatively a new field many discoveries may be confidently expected in the course of a few years.

Stone Blockades and Humanity in War.

The London *Times*, in noticing the blockade of Charleston harbor by the sinking of vessels loaded with stone, uses the following choice language :—

People who would do an act like this would pluck the sun out of the heavens to put their enemies in darkness, or dry up the rivers that no grass might forever grow on the soil where they had been offended, and that such acts ought not be permitted by the guardians of the civilization of mankind.

These same "guardians of civilization," in their war with Napoleon set the following example as stated by Sir Walter Scott, in his life of Napoleon Bonaparte :—

England, . . . unable to get opportunities of assailing French vessels, was induced to have recourse to strange, and, as it proved, ineffectual means of carrying on hostilities. Such was the attempt at destroying the harbor of Bologne by sinking in the roads ships loaded with stones.

A portion of the British press, seizing upon every chance to abuse the people and government of the United States, are bewailing with horror the barbarous modes of conducting the civil war in the United States, but they have no horror for the English mode of dealing with Hindoo prisoners during the East India rebellion, by lashing them to the muzzles of cannon and blowing them to pieces by firing them off in platoons.

We remember seeing this *humane* treatment of rebels graphically set forth in the columns of the London *Illustrated News*. Thus far our government has treated its rebellious citizens "with distinguished consideration."

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Improved Bread and Pastry Board and Flour Chest Combined.

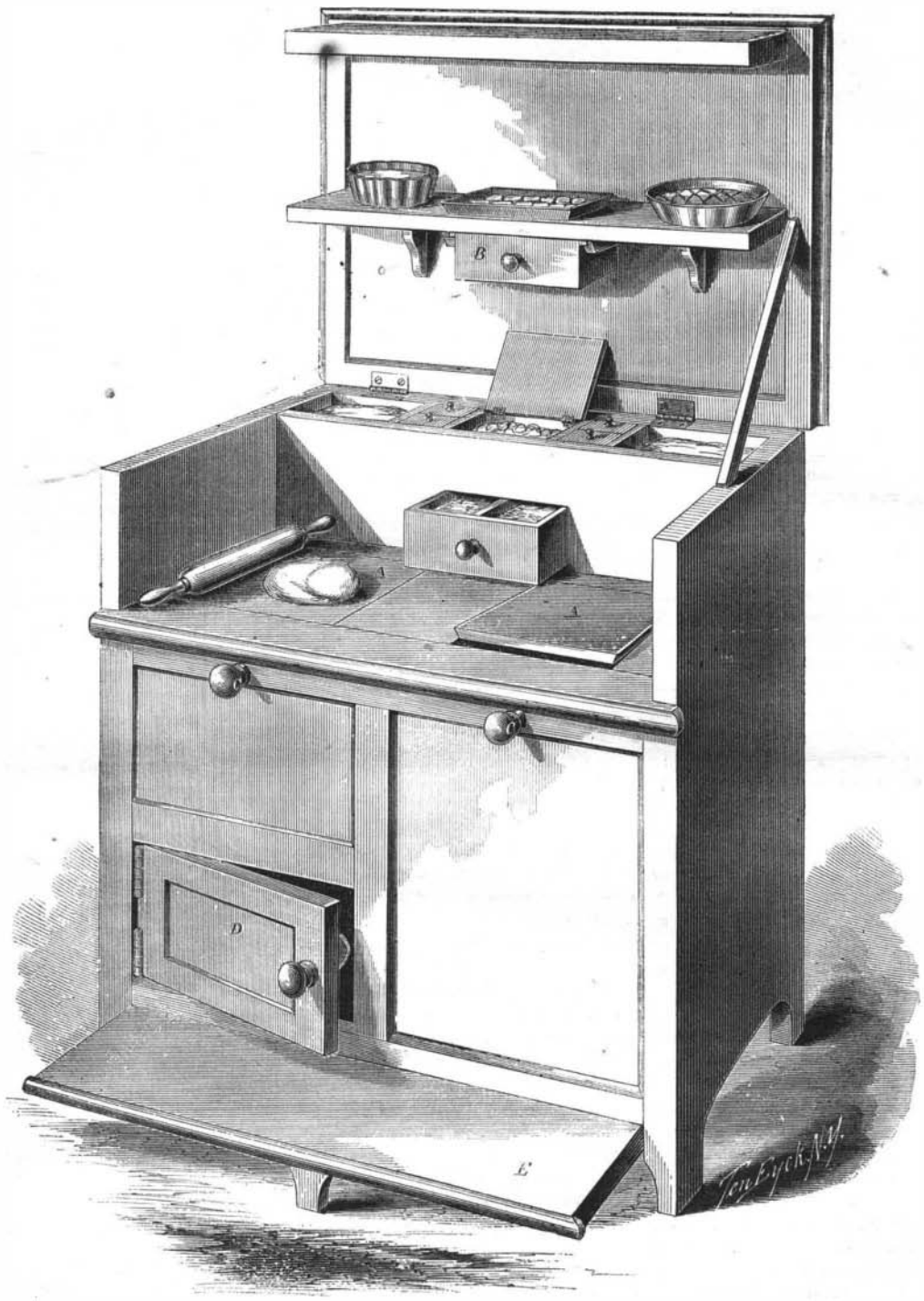
The accompanying engravings illustrate a combined flour chest and pastry board, which is meeting with general approval by the community. The inventor is very successful in selling rights to manufacture, and, according to his own statement, is making money from the invention with a rapidity beyond his anticipations. It combines all the materials and utensils for making bread or pastry in so small compass, and in such convenient position as to save a great many steps in mixing every batch of dough. It will be readily understood by a glance at the cut.

A stout chest is fitted with a lid upon hinges to open as shown. Within the chest are two boxes for different kinds of flour or meal, these boxes having openings in the top which are closed by the trap doors, A A. The cover of the boxes forms the molding board upon which the dough is formed. The lids, A A, are rabbited at their edges to prevent water from leaking down upon the flour beneath, and they are raised by turning the knobs, *c c;* these knobs having oval buttons upon the inner ends of their axles. The drawer, B, is for baking pans; it is held in place when the lid of the chest is closed by a spring. The other drawer and the boxes are for sugar, salt, saleratus spices and small quantities of flour; the last to save trouble of too frequently opening the main flour chests. The closet, beneath one of the flour boxes, is for storing baking pans and other utensils. The shelf, E, which slides into the bottom part of the chest is provided for placing pans and other utensils upon it taking them out of the closet or putting them in; to avoid soiling the floor or carpet.

In regard to this invention, the inventor says:—"I am very glad to state that since I received my patent at your hands I have met with great success in disposing of rights; and in some instances where parties secured to themselves only a small part of territory, after trying it thoroughly, they have made the second purchase. I do not hold the right of the invention at a price unreasonably high, preventing parties approaching me, but hold it at a price within the reach of any one and which at the same time pays me a reasonable compensation. Any person wishing to purchase the right to any territory will find my terms fair in all respects."

The patent for this invention was granted, through the Scientific American Patent Agency, January 1, 1861, and further information in relation to it may be obtained by addressing the inventor, James McNamee, at Easton, Pennsylvania. See advertisement in another page.

The right for the State of Pennsylvania has been sold to J. B. Wilson, of Easton, Pa., who may be addressed in relation to any portion of the territory in that State.



M'NAMEE'S BREAD AND PASTRY BOARD AND FLOUR CHEST COMBINED.

Disinfecting Oils.

L. Bouton, of Paris, has taken out a patent for the following mode of treating heavy coal and other oils to remove their fetid odor. The oil to be treated is introduced with about one-fifth of its volume of water into an agitator, consisting of a closed vessel provided with a shaft having a number of inclined blades or arms, which shaft is rotated at a high velocity, so that its arms by their rotation agitate and mix the oil and other matters contained in the vessel; a suitable quantity of chloride of lime or other disinfectant or decolorizer being mixed with the water. After the agitation has been continued for about twenty minutes, muriatic acid, or any other reactive forming the chemical base of the particular disinfectant or decolorizer employed is to be added, so as to saturate the same, and render its action as complete as possible, after which the agitation is repeated for another twenty minutes. Various disinfectants and declorizers will be required, according to the particular oils to be operated upon; and, as in the treatment of linseed oil, the preparatory process above described may be dispensed with entirely, the disinfecting and decolorizing of the oil being effected solely by the subsequent process of oxygenation hereafter described. The agitating and mixing process having been completed, the contents of the vessel are allowed to rest for a short period, in order that the different matters may separate. The oil which floats upon the surface of the water is then drawn off through suitable cocks, placed a little above the water-level. The lime which floats upon the surface of the water is then removed, and is strained or filtered, in order to extract any oil which may remain therein. The water itself is then drawn off through a discharge-cock at the bottom of the vessel, and is also filtered, in order to collect the base products of the operation contained therein, which, in the case of heavy oils, consist of stearine, saponine, resinous deposits, and other matters, the collection and utilization of which considerably reduce the cost of the whole process. The oil which has been drawn off is now filtered through animal charcoal, after which it is ready for the subsequent process of oxygenation. The object of this second operation is to bring the oxygen of the atmosphere into intimate and close admixture and contact with the entire mass of oil; and, in order to accomplish this more effectually, it is proposed to pass the oil from an upper to a lower reservoir through and over a number of fine strainers and spouts, disposed alternately in a vertical series between the two reservoirs, so that the oil from the upper reservoir will be subdivided in its descent to the lower one into a number of minute streams or drops, thereby exposing a large surface to the oxygenating action of the atmosphere. The oil on reaching the lower reservoir is elevated by a pump or otherwise into the upper reservoir again, when the percolating process is repeated, and this is continued until its complete disinfection and decolorization are effected. The oil is then filtered once more, which completes the process. If it be desired to expedite the oxygenating process, it may be carried on artificially by the production of oxygen in close vessels, in place of submitting the oil or other liquid to the action of the atmosphere only.

Theory of the Coal Beds.

Sir Roderick J. Murchison, in his late address on the progress of geology, states that "the formation of coal has been rather too exclusively referred to terrestrial and fresh water conditions." His theory of the formation of coal beds is more expansive than the old one. He says:—"I have long supported the doctrine that different operations of nature have brought about the consolidation and alteration of vegetable matter into coal. In other words, in one tract the coal has been formed by the subsidence, *in situ*, of vast breadths of former jungles and forests; in another by the transport of vegetable materials into marine estuaries; in the third case, as in Russia and Scotland (where purely marine limestone alternate with coal, by a succession of oscillations between jungles and the sea, and lastly by the extensive growth of large plants in shallow seas."

THE Italian government is about to lay down 200 miles of submarine cable from the Island of Sardinia to Marsala.

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VOL. VI. NO. 5.....[NEW SERIES.].....*Eighteenth Year.*

NEW YORK, SATURDAY, FEBRUARY 1, 1862.

INVENTIVE GENIUS AT THE SOUTH.

In our last number we briefly discussed the importance of encouraging inventive genius to support the military and naval powers of the country. We have recently noticed an extract from a secession journal stating that the ingenuity of southern mechanics had, thus far, proved itself unequal to the demands of the crisis. We are by no means surprised at this result. We have long known that the great bulk of mechanics and inventors were found north of the line, and that three-fourths of all the valuable inventions patented in this country are made by northern inventors. Many have been disposed to use this argument to depreciate Southern skill in the arts, and thereby draw comparisons between the two sections unfavorable to the South. Now, while the fact itself is fully established by the records of the Patent Office, still we have never been able to favor the motive that has stimulated its use. It is a spirit of aggrandizing sectionalism which has aided very much in weakening the cords of sympathy and good fellowship between the Northern and Southern States. The people of the South have been devoted mainly to the production of four great staples, viz., cotton, rice, sugar and tobacco, which have been sources of great national wealth, and have paid no considerable attention to mechanical pursuits. They have been content to pursue their own industries as most profitable, and, as a consequence, they have shown but little skill, comparatively, in the mechanic arts. They have been satisfied to produce their principal staples, and all this time have expended thousands and thousands of dollars at the North to enrich our mechanics and manufacturers, who have, no doubt, supplied them with engines, agricultural implements, shoes, coarse clothing, &c., much cheaper than they could have done it for themselves, and far cheaper than the same materials could have been supplied from any European country. We are unable, therefore, to sympathize with that spirit which we have seen in some sections to belittle Southern mechanical enterprize. It seems to us neither just nor fair. In the prosecution of this struggle against the rebellion the loyal States have had control of the great mechanical power of the country, as well as that of the entire navy. Supposing all these advantages had been at the disposal of the Cenfederates, who believes that they would not have made more impression upon us than we have upon them? Considering all the disadvantages under which they have labored, it must be confessed they have shown a wonderful energy in conducting their unholy crusade against the government, and should the war continue long it must tend greatly to develop the ingenuity and multiply the mechanical resources of the seceded States. With the blockade rigidly enforced, and with all their sources of supply cut off, they are thrown upon their own resources entirely, and, as necessity is the mother of invention, they will develop their latent powers and bring them into use, thus rendering them more and more independent of northern mechanics and manufacturers. This is a fact which must be patent to all who think, and nothing is gained by trying to conceal it.

THE ERICSSON BATTERY.

The steam battery designed by Capt. Ericsson, which was fully described on page 331 of our last volume, is rapidly drawing to completion. The lower iron portion and the wooden part of the upper portion of the hull are finished, and the latter has received four of the six iron plates upon its sides. The propeller, the rudder and one stratum of the iron turret are in place, and the vessel will soon be ready to be launched.

Iron-plated vessels could be made of any size, however small, if the thickness of the iron plates could be varied with the size of the vessel, but as plates must be at least 4½ inches thick to resist solid shot, only a very large ship will float under the enormous weight of this iron armor. The narrow ends even of large ships, have not sufficient buoyancy to sustain two 4½-inch plates upon their sides, and they are consequently left unplated, the armor being applied only to the midship sections.

On account of the unwieldy character of large vessels, the large amount of wealth thus concentrated in a single risk, and, more important still, the great depth of water required for their navigation, it has been considered very desirable from the beginning to construct iron-plated vessels of smaller size, and many plans have been suggested for effecting this. One of the earliest of these contrivances was the erection of an iron-plated tower or turret upon a small vessel, the sides of which should rise very little above the water. This plan has been very extensively discussed in England by societies and in the mechanical papers.

Capt. Ericsson's battery is a modification of this turret device. It is an iron vessel 174 feet long, 41 feet 4 inches wide and 11 feet six inches deep. The deck is flat and the sides are perpendicular to the depth of 5 feet, at which point there is a horizontal projection inward all around the vessel, and the sides then incline downward at an angle of 51° to the vertical line, meeting a narrow and perfectly flat bottom. In the middle of the deck is the circular turret. This is 20 feet in diameter and 9 feet high, formed of 8 one-inch plates of wrought iron bolted together. The turret is to contain two very heavy guns—either 11 or 12-inch bore—and will revolve for the purpose of pointing the cannon.

The successful operation of the devices for supporting and turning the turret appears to us more doubtful than that of any other portion of this battery. When not in action the turret rests with its edge upon the deck of the vessel, but when it is to be turned, its weight is principally transferred to a central shaft 10 inches in diameter, standing in a massive cup which is bolted to an iron bulkhead extending across the vessel. The cup rests upon a large metal wedge, and is raised by driving with a heavy sledge against the wedge, which is then held in place by a screw extending forward from its thinner end. This raising of the cup also raises the shaft so that the latter will support the principal portion of the weight of the turret, the lower edge of the turret resting lightly upon the deck. The turret weighs 140 tuns, and while it is thus hung upon a central shaft, it must be constantly turned to point the cannon, and it is subjected to the concussions not only of its own heavy guns, but also to the battering of the enemy's artillery, to receive which it is being expressly constructed. Several parts must be made sufficiently strong to withstand the strain of this great weight and jar; the cup, the fastenings of the cup to the bulkhead, the bulkhead, the fastenings of the bulkhead to the sides of the vessel, the shaft, and the supports of the turret upon the shaft. If the constructors succeed in securing all these connections so that they will withstand the immeasurable shattering force to which they will be subjected, it will furnish an extraordinary proof of the thoroughness with which our mechanicians do their work.

The plan of placing an iron turret upon a low vessel has such manifest advantages that we trust it will not be hopelessly abandoned even if some of the details devised by Capt. Ericsson should fail, for if the attention of our inventors is directed to the subject, any little mechanical difficulties of this sort would doubtless soon be overcome by simple and efficient arrangements.

Perhaps Capt. Ericsson himself may modify these plans for turning the turret. Whatever may be the success of these details, the grand features of this invention it seems to us belong to that class which incorporate themselves permanently into the arts. The projecting upper portion of the hull, by which the lower portion, as well as the rudder and propeller, are so perfectly protected with so shallow a depth of iron plates, will probably be adopted henceforth in all small iron-plated vessels.

PROGRESS OF COLOR-CHEMISTRY.

The arts are divided by some writers into two general classes—the useful and the ornamental; but distinctions of this character are not always correctly made. Thus the art of coloring as applied to textile fabrics has been classed among the ornamental as contradistinguished from the useful; but this is certainly an erroneous classification. The Creator of the world has not garnished the fields and forests with brilliant colors for the simple purpose of exciting pleasing emotions in man, but also for the purpose of enabling him to distinguish between different objects. The art of coloring, therefore, embraces both the useful and the ornamental.

As applied simply to printing and dyeing, it has been ranged under qualitative chemistry, but in the present day it is vastly more expansive. Latterly, color-chemists have directed their chief efforts to synthetical chemistry in the manufacture of new artificial coloring compounds. By the old modes of operation, infusions of flowers, roots and woods were chiefly used to color cloth, but of late the mineral world has been the favorite field of the chemist, and from radical colorless substances compounds are now produced which impart hues to the products of the loom, rivaling in brilliancy the colors of the flowers. As usual, France has attained the highest distinction in the manufacture of such colors, conspicuous for which are MM. Renard frères and Franc, of Lyons. We have exposed sample of their aniline red, crimson, purple and lilac colors—printed and dyed cotton, silk and wool—to solar light, for the past two months without injury to their permanency. They surpass in brilliancy those obtained from cochineal and orchil, and they appear to be more durable than the latter and as fast as the former.

A new aniline color, called *Bleu de Paris*, has lately come into use for coloring silk and fine wool. It is made by heating sixteen parts by weight of aniline with nine parts of bichloride of tin, in a sealed tube, exposed for thirty hours to 180° of Centigrade. Aniline purples, reds and lilacs, mauves, solferinos, fuchsine, have been described in former volumes of the SCIENTIFIC AMERICAN, and may now be passed over.

A green color, called emeraldine is obtained by mixing a hydrochloric acid solution of aniline with chlorate of potassa, but it is dull and not suitable for dyeing lively tints. Some new chemical combination may render it as brilliant as the gem after which it has been named. A new beautiful yellow product for dyeing silk is obtained by submitting dinitraniline to the action of sulphide of ammonium. Picric acid, which colors a most delicate primrose shade on silk, used to be obtained from that expensive substance, indigo, but it can now be manufactured from carbolic acid, by first boiling it in strong nitric acid, then diluting it in boiling water. A solution of picric acid and the sulphate of copper form a beautiful yellowish green.

Almost every color that can be named is now obtained from products of coal tar. The progress in this branch of chemistry during the past year has been very gratifying to the chemist, but the manufacturer, printer and dyer consider that these artificial colors are still too high in price.

Much attention should now be devoted to improve the processes of their manufacture so as to reduce their expense and thereby obtain cheaper chemical products.

THE IMPORTATIONS OF SALTPETER.—Notwithstanding the war a smaller amount of saltpeter was received in this country in 1861 than during the previous year. In 1861, 59,758 bags were received at Boston, and 20,190 at other ports—a total of 79,847 bags. In 1860, 66,232 bags were received in Boston, and 16,168 at other ports—a total of 82,500 bags. This does not include, however, the amount received upon government account.

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IRON-CLAD VESSELS FOR THE NAVY—WHAT IS THE BEST COATING FOR THEIR BOTTOMS?—A GOVERNMENT INSPECTOR'S REPORT.

How shall the bottoms of iron ships be best protected from oxydation and the adherence of barnacles and seaweeds? This is a practical question of absorbing interest to all commercial nations. On page 9 of the present volume of the SCIENTIFIC AMERICAN we directed the attention of chemists and others to the importance of discovering a new and effective composition for the above purpose, and in response we have received the following communication :—

MESSRS. EDITORS :—A report was recently made by three Commissioners, naval officers appointed by the Secretary of the Navy, to investigate the subject of building iron-clad vessels for naval warfare and harbor defences. In the body of the report made by the commissioners is embraced the following statement :—"One strong objection to iron vessels which, so far as we know, has not yet been overcome, is the oxidation or rust in salt water, and their liability to become foul under water by the attachment of sea grass and animalcules to their bottoms. The best preventive we know of is a coating of pure zinc paint, which, so long as it lasts, is believed to be an antidote to this cause of evil."

There are three points in the above extract from the report of the commissioners to which the attention of the Secretary of the Navy and all persons interested in iron vessels ought to be directed.

That salt water will rapidly oxidize iron is a well-known fact, but it is very strange that when a perfect antidote has for years been known it should not be applied. More than eight years have elapsed since a series of experiments were made by James Jarvis, Esq., under the direction of the then Secretary of the Navy, and the following extract from the report of Mr. Jarvis evinces the fact that a remedy for all the evils spoken of in the report recently made, viz., oxidation or rust, fouling and the attachment of animalcules to the bottoms of iron vessels has long been known :—

U. S. NAVY YARD,
GOSPORT, VA., Dec. 31, 1853.

SIR :—In April last I deposited in the Southern branch of Elizabeth river [opposite this yard] a great number of blocks of wood, on all of which I had painted three coats of all kinds of paint extant. Two or three kinds of the paint, where there were three coats, kept the sea worm from generating or being generated under the surface of the wood. This was not the general fact, except only in the pieces having three coats of white zinc paint. On all other paints the oysters and common barnacle, during the summer, have grown to a considerable size.

I prepared two sheets of iron about eighteen inches square. On two sides I had put on three coats of white zinc paint, and on the two opposite I had put on three coats of red lead. These preparations remained in the river the whole summer. Mark this, the white zinc is as clear of any barnacle as it was when first prepared. On the side of the red lead are many barnacles.

JAMES JARVIS, Inspector.

One of these pieces of iron plate has been left at our office, and, as stated by Mr. Jarvis, the side which was painted with three coats of red lead, is quite rough and rusty, and has no less than ten barnacles of different sizes adhering to it, while the other side, which is coated with zinc white, is free from rust, comparatively smooth, and there is not a speck of shell upon it. If we considered this experiment conclusive as to the zinc white being a perfect protective of the hulls of iron ships it would afford us great pleasure to recommend it unqualifiedly for general adoption. The sample before us would indicate it to be perfectly effective for the purpose stated, but we think that a three-months' experiment does not establish its superiority over any other ingredient tried, although it certainly shows it to be superior to red lead for a coating, and we hope the Navy Department will thoroughly test it upon some of its new iron vessels. Various compositions have been used with quite favorable results. In 1859 the British iron steamer *Himalaya* ran for nine months, making 26,000 miles in that period, and had been in every climate, and yet when she was taken into dock for some repairs the bottom was found quite smooth, the plates free from rust and not a barnacle adhering to them. Red lead was used as a primary coat for the *Himalaya*, and over this a patent composition principally composed of asphalt. Yet this very favorable experiment has not been considered conclusive, on the other side of the Atlantic, as to the virtues of the composition.

On page 344 of the last volume of the SCIENTIFIC AMERICAN, we published the specification of Mr. Muntz for sheathing iron ships with Muntz metal (brass) laid upon the top of a coat of india rubber; and upon another page of this issue of the SCIENTIFIC AMERICAN there is a description of a new mode of sheathing iron vessels with copper laid upon a coat of asphalt, and fastened with screws. English iron shipbuilders seem to have settled down lately to the conclusion that smooth sheet brass or copper is the only sure protection for the iron hulls of ships, hence the many recent attempts to apply the sheathing with a non-conducting substance between it and the iron, so as to prevent the two metals becoming a huge galvanic pile. This, we believe, will be very difficult to accomplish; we are, therefore, disposed to encourage every effort to obtain a perfectly reliable composition for the purpose. We trust that further experiments will be made with the zinc white and other compositions applied practically to iron vessels, and that the results will be communicated to us for publication. It is a subject of vast importance to us and all other nations.

DEATH OF A DISTINGUISHED MANUFACTURER.

One of the most upright and enterprising of our cotton manufacturers has been called away to "the better land." Benjamin S. Walcott, Esq., died at his residence, New York Mills, Oneida Co., N. Y., on the 12th ult., aged 76 years. He was born in Cumberland, R. I., Sept. 29th, 1786; and his father being a manufacturer, he early acquired a competent knowledge of cotton machinery and manufacturing operations. In 1825, while employed as chief machinist in the Oneida Mills, the late Benjamin Marshall, Esq., of Troy, N. Y., selected him as his agent to erect, fit up and manage the original factory, called New York Mills, and ever since he has been identified with the growth and interests of this well known manufacturing village. Under his fostering care it has ever been a model of neatness, activity, morality and intelligence. As agent (with an interest) for Mr. Marshall, he conducted the New York Mills for twenty-two years with great success. He employed the best machinery and the best machinists which could be obtained, and he was exceedingly choice in the selection of careful and able operatives. The goods manufactured at New York Mills have always enjoyed a special reputation for superiority, and have ever brought the highest prices of domestic cotton goods in our markets. Personally, we know that Mr. Walcott was continually expending large sums in obtaining improvements in machinery, whereby he was able to maintain a superiority in his manufactured goods. This was a ruling element of success in his undertakings.

About fourteen years ago Mr. Walcott became main proprietor of the establishment and associated with himself his two sons and Mr. Samuel Campbell, and since that period two other manufactories in the vicinity have been added to the corporation. About five years ago Mr. Walcott retired from active life, leaving the business of the New York Mills factories with the present proprietors—Messrs. William D. Walcott and S. Campbell.

To great practical ability Mr. Walcott added laborious habits and high intelligence derived from personal experience. He had traveled in Palestine, Europe and all sections of the United States. His patriotism was evinced last year by the present of a valuable Mississippi steamboat to our government; and although his body had been prostrated for the past two years with paralysis, his mind was clear to the last, and he ever took a deep interest in all affairs that affected the welfare of his fellow man. Success in business, and the acquirement of great wealth seemed to increase his views of Christian responsibility. He gave $15,000 and his son William $5,000 to Hamilton College to establish the Walcott Professorship of the Evidences of Christianity. This was one of his public acts toward an educational institution, but those who knew him personally can testify that his private and unostentatious acts of benevolence were without number, and seemed to constitute the main engrossing object of his life. In him the poor had a true friend, the distressed and unfortunate a sympathetic counsellor, and his work people looked up to him as a father. He was a model manufacturer.

THE total amount expended by the government in the purchase of fire arms, since the beginning of the rebellion, is twenty-two million dollars.

Does an Error in the Oath Affect the Legality of a Patent?

U. S. PATENT OFFICE,
WASHINGTON, January 14, 1862.

MESSRS. MUNN & Co.—*Gentlemen* :—You ask the opinion of the office upon the following questions :—"Suppose an alien, in applying for a patent, inadvertently makes oath that he is a citizen of the United States, and the error is not discovered until the patent is received, in what manner can the error be corrected—by re-issue or otherwise?"

The records of the office show a precisely similar case. A French citizen, supposing himself, from his long residence in this country, a citizen of the United States, applied for a patent, making oath to his American citizenship. Discovering his error after a patent had issued, he applied for a re-issue, for the purpose of correcting the error in the oath, paying the fee required of a foreigner. The re-issue was granted by Commissioner Mason. It appears, however, by a petition of the assignee of the above-mentioned party, addressed to Congress, a copy of which is before the office, that after the granting of the re-issue the question was raised in the courts whether the Patent laws authorized such a re-issue. It is stated that the matter came before Judge Grier, in the Circuit Court of the District of Pennsylvania, who decided that a re-issue could only be for errors in the specification, and that, therefore, the patent was void. It would appear from this decision of Judge Grier that there is no remedy in the case presented by a re-issue.

The decision of Judge Story, in Alden *v.* Dewey (1 Story 334, 341), would lead to the opinion that the patent would not be invalidated by the error stated. No mode of correcting the error can be suggested by the office.

Respectfully, your obedient servant,
D. P. HOLLOWAY, Commissioner.

How our Soldiers Bear the Winter.

The following private letter, just received by one of our editors from a lieutenant of artillery in the army, at Artillery Camp near Fort Lyon, Virginia, will give an idea of the spirit in which our soldiers are bearing the severities of the season :—

Thinking you might like to hear how we get on during the stormy weather we have had for the last two weeks, I will give you an idea of it. It has snowed or rained about half the time, and the roads are in an awful condition, entirely impassable for loaded teams. We have a board shanty for a mess room with an immense fire place built of brick, taken from a rebel house we demolished. The shanty is 14 by 16 feet, and when the snow melts on the roof leaks at every crack. We are now all sitting with our rubber coats on, and the captain has bored some holes in the floor to let the water out, as we began to fear the craft would founder. But we enjoy ourselves first rate, notwithstanding all this. We sleep in our tents, which are dry, and it will not probably rain forever. Our battery is in tip-top condition now that we have had about twenty horses condemned and exchanged for good ones, and as they have not been worked much, and have plenty to eat and drink and have been under a dry shed, they take a caisson along as though it were a trotting sulky.

Our battery, like nearly all the others, consists of four 10-pounder Parrotts and two 12-pounder howitzers. But I hear that Gen. Barry is going to make all the batteries have two rifle guns and four brass Napoleon guns. These latter are light 12-pounder smooth bores, and in all respects the same as howitzers, only they have a longer range. General B. thinks two rifle guns sufficient for a battery.

Our chief of artillery in this division is the officer who surrendered Brasos Island, Texas, to the Texan rebels last spring. He had, on that occasion, only 12 men while they numbered 600. The account he gave us of the affair was very interesting. He stipulated with them that they should salute his flag, which they did with some of the powder he furnished them, and which had been condemned half a dozen times. It was not strange, therefore, that they took all the afternon to complete the salute. After that the commissioners said they supposed he would allow their steamboat to the wharf. As all he had was one 32-pounder, some condemned ammunition and twelve muskets, which would have stopped their boat about as much as so many squirt guns, he said they might come.

W.

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NOTES ON FOREIGN INVENTIONS AND DISCOVERIES.

Substitute for Brick and Stone for Buildings—A patent has been taken out by L. Standfast, of London, for a composition of burnt clay, iron dust, brick dust, gravel, lime and sand mixed with hemp and hair, so as to form a cement to be laid up in a suitable frame to constitute the walls of houses, thus forming united solid walls when dry, instead of walls made with many small blocks. This application of gravelcement for building is similar to that which has been practiced in many places in America, in building houses with walls composed of gravel and mortar.

Steam Boilers.—R. Rixby and P. W. Lowe, have obtained a patent in England for constructing cylindrical boilers, which have two flues, in such a manner that the two fire grates are placed in the flues and connected by a passage through which the products of combustion pass from one fire to the other alternately. The object of this arrangement of grates is to prevent smoke by consuming it. Fresh coals are fed alternately into the two furnaces, the fires of one being kept at a bright white heat, when the other is supplied with bituminous fuel. The smoke which arises from the newly-fed furnace is conducted through the second fire, where it receives a supply of air by orifices in the grate door, and the smoke then takes fire and is consumed.

Pillars for Coal Mines.—The pillars heretofore generally used in coal mines, for supporting the roofs, have been composed of wood. These decay and are the cause of frequent accidents to miners by permitting portions of the roof to fall. Where fires take place in mines by explosions of gas, timber pillars being very combustible, are generally burned up, thus also causing the roof to fall, the *debris* of which must be cleared away before mining operations can again be commenced. A patent has just been taken out in England, by W. O. Johnston, for the use of cast-iron pillars formed in sections, for supporting the roofs of mines, as a substitute for those heretofore made of wood. These will not decay and they are incombustible.

Manufacture of Alum.—The sulphate of alumina (alum) of the arts is manufactured from alum shales, or clay, by treating them with sulphuric acid in a cold state. A patent has been obtained by A. A. Croll, of London, for making alum by the following process, which is held to be superior to the old methods of operation. Aluminous shale is first roasted and then reduced to powder ; it is then subjected to a dry heat of 300° Fah., in a suitable apartment, and while thus heated the sulphuric acid, of about 1.7 in strength and heated to 300° Fah. also, is admitted and caused to flow over the powdered shale. About equal weights of powdered shale and sulphuric acid are used. When the action of the sulphuric acid ceases, the product is sulphate of alumina in the form of a cake, which is well adapted, in solution, for mixing with pulp in the manufacture of paper. Sulphate of alumina is thus made more rapidly than by the old modes, and a greater quantity is obtained from the same amount of shale.

Coppering Iron Ships.—A great drawback to the admitted superiority of iron ships over those constructed of wood, is the liability of their bottoms to become foul and thus obstruct their course through the water. C. W. Lancaster proposes a system, and has obtained a patent for it, to coat the iron with a thick stratum of asphalt, and while it is yet soft, to place thin copper sheathing on the outside, and thus cement it to the vessel. Small screw studs are also inserted in the iron plates and made to project outwardly, and corresponding holes in the copper sheets pass over the studs, thus uniting the sheathing very firmly to the iron plates, while the asphalt coating separates the copper and iron, thus obviating all galvanic action between them.

Guano Polishing Powder.—A patent has been solicited by W. Clark, of London, for a new polishing material for steel and other metals, composed of the extract of guano 100 parts, fine tripoli 25 parts, common sea salt 10 parts, and wheat flour 12 parts. These substances are mixed together, dried and used for the polishing metals and glass. Diluted alcohol is the vehicle used in applying the powder to the surfaces of the articles to be polished.

Fire Bridges of Boilers.—Instead of using a fire bridge of brick in boilers in the usual way, H. Harlow uses a fire bridge composed of a stack of small thin tubes connected with the water space in the boiler.

RECENT AMERICAN INVENTIONS.

Table and Camp Chest Combined.—The object of this invention is to combine a table and camp chest in such a manner that the table, when not in use, may be folded up and inclosed within the lid of the chest without at all interfering with articles that may be placed within the body of the chest, and also be taken out from the lid, unfolded and adjusted for use, without removing or interfering in the least with other articles in the chest. Invented by H. W. Ball, of New York city.

Machines for Cutting Welts for Boots and Shoes.—The object of this invention, patented by S. D. Tripp, of Stoneham, Mass., is to obtain a machine for cutting welts for boots and shoes, which will automatically adjust its cutters so that the leather strips which are of rectangular or approximate form will be cut precisely through the center and in an oblique direction, the cutter being so moved or operated as to conform to the different thicknesses of each individual strip, so that the two pieces which are formed of each strip will correspond precisely in their thickness, whatever the thickness of the strip may be. The invention consists in using, in combination with a pair of rollers, a cutter, constructed in a novel manner and connected with the axis or shaft of one of the feed rollers, which is a yielding one, in such a way as to be moved or adjusted relatively with the leather strip to be cut, and effect the desired end.

Improvement in Ships, &c.—In war vessels built according to the plans and models in present use, clad with iron or steel armor plates and propelled by steam, unless they are of too small size to be safe and formidable sea-going vessels, it is impossible to obtain carrying capacity sufficient for the battery and for machinery powerful enough to obtain high speed, with coal enough for several days' service, without so great a draft of water as to render it impracticable for them to enter most bays, harbors, rivers and other inland waters. The principal object of the first part of this invention is to overcome this difficulty, and to this end this part of the invention consists in the construction of a vessel with two stern posts, having between them a double-inclined run and midship keel, and with two screw propellers working one through each stern post, by which construction the vessel is enabled to be made with a very flat floor, and great width of beam extending very far aft, and so has its buoyancy and carrying capacity increased without interfering with its propelling or steering qualities. The same construction is also applicable, with corresponding advantage, so far as lightness of draft and carrying capacity are considered, to vessels for other than war purposes. The second part of the invention consists in the construction of a vessel for the purpose of making it serve as a battering ram against other vessels or structures, with a pointed prow terminating near the water line, and having an inclination in every direction, viz., upward, downward and laterally toward the bow of the vessel, such prow not being simply put on the outside of the vessel, but being built with and forming a part of the vessel, and thereby having great strength and stability. This prow is to be covered with iron or steel armor plates, and heavily clad with steel at its point. Invented and patented by John B. Sardy, of New York city.

Improved Water Meter.—This improved meter, patented by John E. Van Winkle and Joshua Mason, of Paterson, New Jersey, consists of a sector-shaped box, divided into two chambers, and fitted to oscillate upon a stationary hollow shaft, which contains inlet and outlet passages, and constitute a valve for the induction and eduction of the water or other fluid to and from the chambers, that the said box may derive an oscillating motion from the overbalancing of one and the other chamber alternately, as they are alternately filled and discharged. The oscillating box is so combined with a registering apparatus as to have the number of its oscillations registered, and this regulation constitutes a registration of the quantity of fluid passing in and out of it. An important feature of the invention consists in an adjustable counterbalance, so applied to the oscillating box as to serve as a means of adjusting the meter to measure correctly.

Stop Motion for Power Looms.—This stop motion is designed more particularly for looms in which two or more shuttles are employed, either with rising and falling, or, as they are called, drop shuttle boxes, or with rotating shuttle boxes. It is composed, in part, of feeling forks attached to the breast beam of the loom, and grids attached to the lay, in some degree like the fork and grid used in the ordinary filling stop motion of plain looms, but a fork and grid are used on each side of the loom instead of on one side only. One feature of the invention consists in a peculiar contraction of and mode of applying and operating the grids, whereby they are made to act only upon the thread of the shuttle that is in operation, and passing into one of the boxes, and not upon the threads of the shuttle or shuttles that are to rest in the boxes. Another feature consists in an improved mode of combining one of the feeling forks with the lever by which the belt shifter is thrown out of its notch to throw the loom out of gear when the filling has broken or given out. Another feature consists in the combination of the two feeling forks, arranged on opposite sides of the loom, to operate upon or in connection with the same lever, for throwing out the shipper. And the last feature consists in an improved positive stop mechanism, to stop the loom after it is thrown out of gear. Patented by William Graichen and Charles Hoffman, of Clinton, Massachusetts.

Mode of Securing Chimneys to Lamps.—The object of this invention is to obtain a means whereby glass chimneys may be attached to lamp tops in a secure manner, and without danger of the same being broken while in the act of securing the chimney to the lamp top, or by the expansion of the chimney by heat. It consists in the employment or use of an angular metal clamp, provided with a hinge or joint and inclined projections, in connection with loops or lips attached to the lamp top, the clamp being fitted on a flange at the lower end of the chimney, and the clamp secured to the lamp top by means of its inclined projections fitting under the loops or lips on the lamp top. Patented by Alfred Bliss, of New York city.

Grain and Grass Harvester.—This invention consists, first, in placing a wheel within the shoe at the inner end of the finger bar, for the purpose of facilitating the passage of said shoe over cut grass or grain which may lie in its path. It consists, second, in an improvement in the construction of the harvester, whereby a ready egress is allowed for moisture and any trash which might find its way beneath the sickle, the choking or clogging up of the latter being thereby prevented. It consists, third, in a novel arrangement of parts for elevating the finger bar and sickle, whereby said elevating device is not allowed to interfere in the least with the turning of the finger bar and sickle. It consists, fourth, in a novel and improved way of constructing the main frame of the machine, whereby the same may be very economically put together, and rendered very strong and substantial. Patented by John Powers and E. M. Smith, New York city.

FRESH MAPLE MOLASSES.—A correspondent of *Field Notes* gives the following :—Maple molasses well made and put up in cans right from the kettle, and hermetically sealed, as you would can and seal fruits, will keep as fresh as when first boiled from the sap, and this is decidedly the best plan for keeping, as when made in cakes, if exposed to the air, it will lose somewhat of the peculiarly delightful flavor for which it is so prized, and is often injured by insects. All this is obviated by canning while hot. To many families who do not make it on a large scale, this need be but little expense, as the cans that have been emptied through the winter can be used until autumn fruits demand them again. Put up your best in this way. Where large quanties are made for market, the buyers must select and can for themselves.

AT the last meeting of the Illinois State Agricultural Society, at Springfield, Mr. J. H. Smith, of Quincy, exhibited one tun of sugar made by himself, from northern cane. He states that about seven-tenths of the sirup runs to sugar, and that he can make the sugar at five cents per pound, and molasses at twenty-five cents per gallon, and realize more profit from an acre of cane than he can from an acre of corn.

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ISSUED FROM THE UNITED STATES PATENT OFFICE

FOR THE WEEK ENDING JANUARY 14, 1862.

Reported Officially for the Scientific American.

*** Pamphlets giving full particulars of the mode of applying for patents, under the new law which went into force March 2, 1861, specifying size of model required, and much other information useful to inventors, may be had gratis by addressing MUNN & CO., Publishers of the SCIENTIFIC AMERICAN, New York.

34,124.—John Baldwin, Jr., of Berea, Ohio, for an Improvement in Machines for Making Grindstones :

I claim the inclosure, G, fan, L, chamber, M, and discharge pipe, N, when these parts are arranged as described, and used in combination with a machine for forming grindstones, and operating as and for the purpose set forth.

34,125.—Alfred Bliss, of New York City, for an Improvement in Lamps :

I claim the annular clamp, D, formed of two parts, b b, connected together at one end by a hinge or joint, c, in combination with the loops or lips, f f, on the lamp top, A, substantially as and for the purpose set forth.

34,126.—Freeman Brady, Jr., and J. C. Noble, of Washington, Pa., for an Improvement in Magazine Gun :

We claim the combination of the aperture, f, catch, G, and spring, H, employed as set forth, to secure the magazine and permit its ready insertion and removal laterally of the stock.

34,127.—W. C. Bridges, of Philadelphia, Pa., for an Improvement in Optical Telegraphs :

I claim the tube, B, with its lens and one or more adjustable mirrors, arranged substantially as described, in combination with the device described, or any equivalent to the same, for obscuring or exposing the lens or moving differently colored plates of glass to the front of, and away from, the lens, as set forth for the purpose specified.

34,128.—Moses Chandler, of East Corinth, Maine, for an Improvement in Horse Hoes :

I claim, first, Attaching the wings, H H, of the implement to the beam, A, by means of the rod, I J, which are fitted in eyes, g, at the ends of bolts, K, in the beam; in combination with the joints, h, which connect the front ends of the parts, d, of the wings to the rods, I, and the slot, i, in the lower parts of the rods, J, through which the bolts, f, at the back ends of the parts, d, pass, whereby the wings may be adjusted, as and for the purposes set forth.

Second, Forming the wings, H H, of two parts, d e, connected together by a pivot or bolt, f, for the purpose specified.

Third, The adjustable and yielding cultivator blades, F, when arranged as shown and used in connection with the wings, H, for the purpose set forth.

Fourth, In combination with the wings, H, attached to the beam, A, as shown, the stay rods, L, and adjustable bolt, M, arranged as shown, to insure the proper bracing of the wings, H, at all points of their adjustment, as described.

[The object of this invention is to obtain an implement of simple construction which may be adjusted so as to furrow land for planting either in hills or drills, and form the furrows at a greater or less distance apart, and at greater or less depth, as may be desired; the implement also being designed to be capable of covering seed in the drills of an uniform depth, and of any desired depth, and also to hoe and hill up growing crops.]

34,129.—Edwin Clark, of Lancester, Pa., for an Improvement in Flouring and Grist Mills :

I claim, first, The conic cylinder, J, with its central distributing disk, Y, connecting arms, Z, and lugs, R R, beneath it, when employed in combination with the balance rim, substantially as set forth.

Secondly, I also claim the distributing disk, Y, (Fig. 3) with its lugs, R, without the conic cylinders, when employed in combination with the balance rim aforesaid.

Thirdly, I also claim the adjustable tube, O, with its vibrating section, O, and set screw, P, in combination with the distributing disk, Y, substantially as specified.

34,130.—Edwin Clark, of Lancaster, Pa., for an Improvement in Alarm Indicator for Grist and Flouring Mills :

I claim combining with the buhr spindle of a mill, or with any other moving part of the mill gearing, a governor, and an alarm apparatus, by which any variation from the proper or previously-regulated velocity of the buhr or buhrs, for good grinding, will be brought to the notice of the attendant, substantially as described.

I also claim, in combination with the buhr spindle, or other moving part of the mill gearing, and a governor, a rod hand, or indicater, that will show to the attendant when the speed of the buhr, or buhrs, is at its regulated or desired velocity, or any variation therefrom, whether greater or less, substantially as described.

34,131.—W. F. Cochrane, of Springfield, Ohio, for an Improvement in Grain Thrashers and Separators :

I claim, first, Locating the driving gear upon the base of the machine, substantially in the manner described for the purpose set forth.

Second, Inclosing the driving gear in a solid stand or frame, independent of the main frame, substantially as described.

Thirdly, The combination of the diagonal braces, a, with the combined stand, B, substantially as described for the purpose specified.

Fourth, Pivoting the combined stand to the main frame, substantially in the manner and for the purpose described.

Fifth, The combination of the combined stand, B, lever, C, and lifting screw, c, substantially in the manner described for the purpose set forth.

Sixth, Driving the thrashing cylinder directly from both ends of the countershaft, and independently of the separating mechanism, as described.

Seventh, Driving the thrashing and separating mechanisms independently of each other by means of pulleys on each end of the counter shaft, cylinder shaft and beater shaft, as described for the purpose specified.

34,132.—W. F. Cochrane, of Springfield, Ohio, for an Improvement in Grain Thrashers and Separators :

I claim, first, Mounting the thrashing and separating mechanisms in an independant adjustable frame, capable of moving freely in a vertical plane within the main frame, for the purposes set forth.

Second, The combination of the driving gear and thrashing cylinder, substantially in the manner described.

Third, The combination of the driving gear and separating mechanism, substantially in the manner described.

34,133.—W. E. Cochrane, of Springfield, Ohio, for an Improvement in Grain Thrashers and Separators :

I claim, first, A creeping cloth arranged transversely across the machine to convey the winnowed grain directly from the vibrating shoe to the bagger.

Second, The combination of a vibrating shoe, a creeping cloth and a fan shaft, substantially in the manner described.

Third, The combination of a creeping cloth, a fan shaft and a vibrating shoe, with an adjustable or independent frame, substantially as described.

34,134.—J. H. Dennis, of Louisville, Ky., for an Improvement in Running Gear of Railroad Cars :

I claim, first, The combination with a divided axle, C C′, or two axles working in line, of a compound journal box, E, constructed and adapted substantially as shown and explained, to afford both bearings and connection to the adjacent ends of the said axles.

Second, The combination of the wick, H, tube, I, and clamping screw L, employed substantially in the manner explained to supply the journals automatically with oil, and control the flow thereof as may be required.

[This invention is an improvement in mounting and running divided axles. The inner journals have their bearings in a compound journal box, which also constitutes a connection between them, and are constantly lubricated to any extent required by an ingenious automatic device.]

34,135.—J. H. Dennis, of Louisville, Ky., for an Improvement in Railroad Turn Tables :

I claim any device, substantially as explained, whereby the table, while permitted to turn freely in one or the other direction, is automatically arrested the instant the rails are in position to enable the car to return on the track by which it approached.

[The object of this invention is to enable the driver readily to reverse the position of his car without leaving his position upon the platform or seat.]

34,136.—J. H. Dennis, of Louisville, Ky., for an Improvement in Omnibus Springs :

I claim connecting the bed, G, to the longitudinal bars or springs, B B, by means of a transverse bar, F, springs, E E′, and hangers, D, substantially as and for the purposes explained.

[This invention consists in an improved construction and combination of springs and supporting bars, affording strength, durability, ease and quietness of motion, and likewise reducing the weight and cost of construction of the carriage.]

34,137.—Joseph Edgecomb, of Worcester, Mass., for an Improvement in Boring Machines :

I claim, first, Constructing frame F, in curved form, and so as to extend around the flanges, d d, of frame, D, to reduce friction and afford sufficient space for the free operation of the rack and gearing, substantially as described.

Second, The combination of the curved hinged rack piece, M, and gear, L, with frames, D and F, substantially as and for the purpose set forth.

Third, The combination with the top of frame, D, and rack piece, M, of the cap piece, N, and its slotted tubular projection, m, and its spring, n, as and for the purposes set forth.

Fourth, The combination of the adjusting rod, O, with rack piece, M, frame, F, and the parts connected therewith, substantially as and for the purposes set forth.

34,138.—James Fitton, of Cavendish, Vt., for an Improvement in Carding Engines :

I claim the arrangement and combination of the apron with the mechanism preceding the main card cylinder, in such a manner that the apron shall extend under the said mechanism for the purpose described.

34,139.—W. W. Flenniken, of Colony, Iowa, for an Improved Water Wheel :

I claim having the buckets, c, of the wheel, F, connected at their outer ends and lower part, so as to form a continuous rim all around the wheel, while the upper ends of the buckets are detached, when said wheel thus constructed is used in combination with a stationary deflecting plate, placed at the top of the wheel and secured to the scroll, A; all being arranged as and for the purpose set forth.

[This invention relates to an improvement in that class of water wheels which are commonly termed "center vent," and are placed on a vertical shaft within a scroll. The object of the invention is to prevent the escape or leakage of water around the wheel at its junction with the top and bottom of the scroll.]

34,140.—H. B. Goodyear, of New Haven, Conn., for an Improvement in Gaiters :

I claim, as a new article of manufacture, a gaiter wholly or in part elastic made of vulcanized india rubber, or of its elastic compound, or its equivalent, and backed by a knit web or other textile tensible fabric, the upper surface being varnished, and the whole constructed substantially in the manner set forth.

34,141.—William Graichen and C. Hoffman, of Clinton, Mass., for an Improvement in Power Looms :

I claim, first, The grids, A A′, constructed with projections, a a, in front of the lower parts of their dents, b b, applied in guides formed in, or upon, or attached to the lay and having a rising and falling motion, substantially as and for the purpose described.

Second, Operating the so-constructed grids by means of a rock-shaft, B, arms, e e g, a spring, f, and a fixed stud, h, the whole applied, arranged and combined substantially as specified.

Third, The feeling-fork lever, E, working on a fixed fulcrum and combined with the horizontally moving lever, H, which acts on the belt shipper by means of a bent lever, G, attached to the said lever, H, and connected with E, substantially as specified.

Fourth, The positive stop motion composed of the stop piece, v, on the lever, H, the rod, T, the spring, Y, the lever, S, and stop wheel, Q, and spring, Z, the whole arranged, combined and operating substantially as and for the purpose specified.

34,142.—J. J. Haley, of South Dedham, Mass., for Improved Rollers for Wringing Machines :

I claim my improved roller, made substantially as described.

34,143.—E. C. Hamlin, of Pavilion, N. Y., for an Improvement in Car Coupling :

I claim the employment in self-couplers for cars, of a link with a circular head and slot, as described, in combination with the adjusting circle, C, and follower, F. Also the combination and arrangement of the adjustable clamping yoke, y, and pin, p, with the lever, R, and pawl, r, as and for the purposes specified.

34,144.—Adam Hawver and W. H. Hanyen, of Galva, Ill., for an Improved Churn and Butter Worker :

I claim the dasher, D, staff, E, concave, C, inclined bottom, B, partition, c d, circular flange, e, and section, g, when combined, arranged and operating in the manner and for the purpose set forth.

[This invention relates to that class of churns in which a reciprocating dasher is employed to effect the liberation of the butter; the object being to obtain a simple and efficient device for churning, which will answer equally well to work the butter after it has been churned.]

34,145.—Josiah Hayden, of Columbus, Ohio, for an Improvement in Water Elevators :

I claim the special arrangement of the shifting gears, N P, in combination with the windlass wheel, K, flat chain, L, bucket, E, pin, G, and bail, c, when these parts arranged and operated in the manner and for the purposes set forth.

34,146.—James Jenkins, of Elizabeth, N. J., and G. H. Cook, of New Brunswick, N. J., for an Improved Method of Working Silicious and other Calamine Ores of Zinc :

We claim the use of oxide of iron, iron ore, lime, or limestone or other basic substance, either separately or mixed, as a flux or fluxes, for separating the silica and other earthy impurities, from the zinc contained in the silicious and other calamine ores of this metal, in the manner substantially as set forth, these ores being first prepared for working in the common way.

34,147.—Henry Isham, of New Britain, Conn., for an Improvement in Water Meters :

I claim combining two or more water meters, substantially as described, by means of a compound valve, or the equivalent thereof, substantially as described, and operated by the force of the passing water, as set forth.

34,148.—R. A. Hooe, of Washington, D. C., for an Improvement in Tobacco Pipes :

I claim making the body of a pipe of three main divisions, to wit, a removable tobacco chamber having a perforated metallic base, and metal sides; a smoke-circulating chamber, and a saliva reservoir opening from below, the whole being constructed, arranged and combined substantially in the manner and for the purpose described.

I also claim the main division, A, in combination with the main division, B, the two divisions being united in the manner and for the purpose described.

34,149.—Charles Leavitt, of Cleveland, Ohio, for an Improvement in Carriage Wheels :

I claim so dividing the two parts of the hub, F and G, into alternate depressions and projections, having their longitudinal faces bounded by radial lines from the center of the axle, and filling the alternate spaces, a and e, with spokes, in such a manner that each spoke shall have in part a metallic bearing upon each side, filling the entire space with spokes, as described, in combination with the concave face of F and the convex face of G; the nut, H, and cap, K, operating as and for the purpose set forth.

34,150.—James Leffel, of Springfield, Ohio, for an Improved Water Wheel :

I claim, first, The combination of the parts, B C and D, with the buckets a and b, arranged in relation to each other as and for the purposes set forth.

Second, The combination and arrangement of the parts mentioned in the above claim with the valves or gates, H, and the wheel casing, E, composed of the parts, F G and E′, substantially as described.

Third, The combination of the wheel, A, as seen in Figs. 2, 3, 4 and 5, with its casing, valves and the means for operating the same, as seen in Figs. 1 and 2, when said parts are constructed and arranged to operate in relation to each other, as set forth.

34,151.—R. F. Loper, of Philadelphia, Pa., for Improved means for Covering and Repairing Iron Ships and other Navigable Vessels :

I claim the planking of old iron boats or second-hand vessels, as set forth, whereby a safe and good vessel or boat can be made out of any iron vessel or boat, after the iron has become thin by wear or rust, as described.

34,152.—J. W. Mackintire, of Woburn, Mass., for Improvement in Stalls for Horses :

I claim my improved stall, as constructed with the opening, B, the door, c, and the rack, E, applied and made to operate together, substantially in the manner set forth.

I also claim the V-shaped rack, arranged and made to operate in the manner set forth.

34,153.—B. A. Mason, of Newport, R. I., for Improvement in Casting Projectiles for Firearms :

I claim the reciprocating dies and plunger, substantially as described, in combination with the hopper, provided with the spring stops or equivalent means for holding up the slug of lead, until it is acted upon by the plunger, as set forth.

34,154.—Robert McCain, of Rootestown, Ohio, for Improvement in Feed Cutters :

I claim the detachable box, Y, in combination with the feed and cutting apparatus, arranged as and for the purpose set forth.

34,155.—Thomas McDonough, of Middletown, Conn., for Improved Hot-Air Engine :

I claim, first, A plunger, containing a piston and chamber, and moving through a fixed packing ring, substantially as described.

Second, The bowl, D, upon the end of the plunger, substantially as described.

Third, The connection of the piston and fly wheels by side rods, in combination with the open plunger, substantially as described.

34,156.—Marvin Mead, of Bedford, Michigan, for Improvement in Tire-Upsetting Machines :

I claim the employment of the concave adjustable clamps, F F, when arranged and used with the arms, B B, the levers, D E, the connecting rods, c c, and rest, G, the clamps being connected to the levers, D, by means of a ball joint, and their ends being formed so as to lap or joint on the outside of the tire, as and for the purpose specified.

34,157.—Martin Metcalf, of Grand Rapids, Mich., for Improvement in Comb Frames for Bee Hives :

I claim constructing the top bar, A, and side bars, B, of adjustable frames for beehives, with the beveled ends, a b, in the manner described, when used in connection with a movable front, and in a rectangular box or hive.

34,158.—Freedom Monroe, of Romeo, Mich., for Improvement in Machines for Filling Wagon Ruts on Highways :

I claim the frame work which stands upon the ground, the posts each side, the bench and wheels on top, the post and lever, the pulley and cord, the platform, the driver's seat, and the post passing up through the same, the hooks, band and straps round the axletree in combination.

34,159.—William Morehouse, of Buffalo, N. Y., for Improvement in Spoke-Tenon Augers :

I claim, broadly, A center-sliding plug, which performs the double function of centering and gaging the varying sizes of tenons.

Second, A graduated center-sliding plug, in combination with a tubular sleeve, a compressible spring, and a surrounding tubular socket.

Third, A tubular sleeve, carrying a centering pin, in combination with a compressible spring, a steady pin, and a surrounding socket, substantially as described.

Fourth, I claim knife blocks and guide blocks, having scolloped inner ends, as described, in combination with a graduated center sliding plug, and tubular sleeve, as described.

Fifth, I claim making the shank, c, and steady pin, f, in one piece, and confined to the socket, A, by an intermediate screw body, which forms shoulders for one end of the socket, and one end of the spring to abut against.

34,160.—Charles Monson, of New Haven, Conn., for Improved Extension Table :

I claim the improved extension table, as constructed with two leaves, A B, combined with the stand, c, by means, and so as to operate substantially as specified.

And in combination with the leaves and stand, when made and applied together, as described, I claim the finishing bars or strips, F F to be arranged in manner and for the purpose, substantially as set forth.

34,161.—Francis Murgatroyd, of Cleveland, Ohio, for Improvement in Oscillating Steam Engines :

I claim, first, The combination of the openings, s s, and e e, so as to open two ports to steam, and two to exhaust at the same time.

Second, I claim the valve, figure 7, in combination with the reversing lever, O″, by means of which the engine can be reversed at pleat sure, as specified.

34,162.—Charles Neer, of Albany, N. Y., for Improvement in Metallic Blinds for Windows, &c.:

I claim, first, The strips, c, bent or folded, as shown, and applied to the iron blind frame, composed of the vertical stiles, a a, united to each other by the cross bars or rails, b b, the parts receiving the tenons of the blind slats, as set forth.

Second, I claim the metallic slats, e e, attached at their lower corners, and provided with the disk, 5, and spring, 6, for the purposes, and as set forth.

Third, I claim the bars, h, hinged to the blind frame, as set forth, so that they can be turned against the slats to keep them shut, as specified.

34,163.—A. M. Peniston, of Wellington, Missouri, for Improvement in Seeding Machines :

I claim the arrangement and combination with a seed planter, substantially such as described, of the rock shaft, o p p, plug or ball valves, q q, lever, r, with a curved slot, u, and the sliding clutch, v, as and for the purposes set forth.

34,164.—W. S. Sampson, of New York City, for Improvement in Grain Bins :

I claim forming the bins of a granary for storing grain in bulk, of alternate cylindrical chambers, and chambers formed partly of flat walls, and partly of portions of each of the contiguous cylinders, substantially in the manner and for the purpose, as set forth.

34,165.—John B. Sardy, of New York City, for Improved Construction of Ships of War and other Navigable Vessels :

I claim the combination of two or more stern posts, a a, two or more keels, d d, and two or more propellers, h h, or other motors, revolving in the same vertical plane, constructed and operating in the manner and for the purpose described, in order that greater buoyancy, speed and capacity may be obtained.

I claim, also, the combination of the central keel, e, with keels, d d, and propellers, h h, and inclined runs, b b, substantially as specified.

I also claim the pointed prow, tapered in all directions, when used in a hull, as before described.

34,166.—John Schaffer and Edward Spencer, of St. Louis, Mo., for Hand Printing Press :

We claim making a hand stamping press, substantially in the manner described, so as to stamp and perforate the ticket, ink the form, and supply the ink to the inking roller, in a single operation, substantially in the manner set forth.

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34,167.—J. A. Schneider, of Cleveland, Ohio, for Improvement in Truss Pads:

I claim a truss, consisting of a slotted pad, N, a pad plate, made of a slotted part, G, and a part, G′, in combination with a sliding piece, c, hinge, J J, and spiral spring, F, when the parts are arranged in relation to each other, as set forth.

Also a pad plate, made in two parts, G G′, the part, G, being adjustable, so as to cause the pad attached to the pad plate to bear obliquely, as set forth.

34,168.—H. C. Small, of East Limington, Maine, for Combined Writing Case and Checker Board:

I claim the checker board, made of strips of wood, or other suitable material, attached together in the manner described, in combination with the writing case, the whole together constituting a new article of manufacture.

[The object of this invention is to combine a writing case and checker board in such manner that the latter shall occupy but comparatively little room in the former, which, beside, has apartments for pens, ink, postage stamps and checkers in one part, and for envelopes, penholders and pencil in another part; the checker board, when removed from the writing case answering either for games or for a writing desk, and the whole, when packed, bronght into such small compass as to be carried in a soldier's knapsack or pocket without inconvenience.]

34,169.—D. C. Smith, of Adrian, Mich., for Improvement in Stump Extractors:

I claim the combination with a tackle, block and rope of a beam, A, with a shore, B, and shoe, D, attached thereto, the whole being mounted on two wheels and axle, as described, for the purposes set forth and described.

Second, I claim the combination of the shivers, F F F, for the purpose of allowing the team to draw at any angle, as described.

Third, I claim the combination with the chain, l l, of the windlass, 9, drum, 8, rope, 7, windlass, X, crank, Z, and pawl Y, for the purposes set forth and described.

34,170.—John Taggart, of Roxbury, Mass., for Improvement in Pegging Machines:

I claim the combination of the back-latching mechanism, or stud, l, and spring catch, m, and its unlatching mechanism, or lever, h, and cord, o, with the hammer and the peg driver.

I claim my improved lasting mechanism, having its parts constructed and applied, in manner as set forth, and so as to operate together, as described.

I also claim the combination of the eccentrics, b2, the lever, a2, and their pitmen, y z, as applied to the shaft, c2, and each side of the lasting block, and its heel and toe clamps, as described.

34,171.—Nicholas Taliaferro, of Augusta, Ky., for Improvement in Revolving Ordnance:

First, I claim the arrangement of recessed front cheek, I I I I′, rear cheek, M, revolving breech, N O R, and dovetailed bearing, P Q, the whole being combined and operating, substantially as set forth.

Second, The screw-threaded bush, V, adapted for insertion within and removal from the rear end of the bore of a breech-loading cannon, in the manner and for the object stated.

Third, Supporting a cannon upon a downwardly-projecting ball trunnion, G, confined within a socket, D, and resting upon an adjustable step, E, all substantially as shown and explained.

Fourth, The described application of water pan, W, inclosing the lower portion of the revolving breech, N O R, as set forth.

34,172.—S. D. Tripp, of Stoneham, Mass., for Improvement in Machines for Cutting Welts for Boots and Shoes:

First, I claim the employment or use, in connection with the feed rollers, C D, of a cutter, L, arranged and connected with the yielding roller, D, in such manner as to be turned or adjusted automatically by the yielding movement of said roller, substantially as and for the purpose set forth.

Second, Forming the cutting edge of the cutter, L, by means of the basils, f f′ f″, which are respectively above, below, and at both sides of the cutter, as and for the purpose specified.

Third, Having the shaft, E, of the lower roller, D, fitted in a tube, F, which is connected by a bar, d, with a rock shaft, G, and acted upon by a spring, H, when said parts are used in connection with the cutter, L, connected with the shaft, G, and all arranged as and for the purpose set forth.

34,173.—J. E. Van Winkle and Joshua Mason, of Patterson, N. J., for Improvement in Water Meters:

We claim the combination of the stationary, partitioned, slotted, hollow receiving and discharging axis, B, with the oscillating water box, A, substantially in the manner shown and described, so that the water will enter, operate and be discharged from the compartments of said box, through the said axis, all as set forth. The combination of the air connecting pipe D with the compartments, a a′, substantially as and for the purpose shown and described.

34,174.—C. P. S. Wardwell, of Lake Village, N. H., for Improved Planing Machine:

I claim the hinged bed plates, L L, arranged and operating substantially in the manner and for the purposes specified.

I also claim the gages, D D, adjustable on and in combination with the bed plates, L L, substantially as described.

I also claim the combination of the adjustable edging saws, G G, with the hinged bed plates, L L, and adjustable gages, D D, substantially as and for the purpose set forth.

I also claim the combination of the vertically-adjustable bed, E, and hinged bed plates, L L, with the cutter head, W, substantially as specified.

I also claim the combination of the doubly-adjustable guides, A A, with the hinged bed plates, L L, adjustable edging saws, G G, and gages, D D, substantially as set forth.

I also claim the combination of the smoothing cutters, S S, on the gages, D D, with the edging saws, G G, for the purpose set forth.

I also claim the obliquely-situated serrated wheels, R R, whether acting in connection with or in the place of the rollers, Q Q, in combination with the gages, D D, arranged and operating substantially as and for the purpose specified.

I also claim the combination and arrangement of the sliding bars, G O, and their inclined projections, n n, and connecting lever, P, with the inclined projections, o o, on the bottom of the hinged bed plates, L L, operating substantially as and for the purpose set forth.

I also claim the combination of the two curved pressure and fender plates, V X, mounted respectively on hinged arms, r r and w w, and drawn down by springs, v v, with the cutter head, W, substantially as specified.

34,175.—Dyer Williams, of Syracuse, N. Y., for Improvement in Locomotive Axles:

I claim the improvement of locomotive engines, by the employment of a crank axle, constructed in the manner and for the purposes set forth.

34,176.—W. W. Wilson, of Collins Station, Ill., for Improvement in Corn Planters:

I claim the distributing wheels, E, cups, f, hoppers, F G, frames, g, rods, a, conducting tubes, b, adjustable plows, I, standards, J J, guides, c, and double brackets, d, with the frame of the machine, when combined, arranged and operating in the manner described.

[This invention relates to that class of machines which form the furrow, deposit the seed and cover it at one operation, and it consists in a simple arrangement of seed, distributing device and adjustable plows, whereby the implement is made to work with unerring accuracy, and adapted to plant to any desired depth.]

34,177.—J. F. Winslow, of Troy, N. Y., for Improved Machine for Compressing Puddle Balls:

I claim the combination of the steam cylinder, F, the ram or hammer, R, the cam wheel, C, with each other, substantially as and for the purpose described and set forth.

34,178.—A. M. Bailey and J. O. Couch (assignors to The Metropolitan Washing Machine Co.), of Middlefield, Conn., for Improved Clothes Wringer:

We claim in clothes-wringing machines having rollers, A B, geared together at one end by gear wheels, M N, constructing and arranging the spring or springs, and the stop, H, or its equivalent, substantially as and for the purposes set forth.

31,179.—J. W. Barker and J. P. Haskin, of Syracuse, N. Y., for Improvement in Purifying Common Salt:

We claim the mode of decomposing the impurities in common salt by immersing or washing it in a solution of any one or more of the carbonates of ammonia or of any one or more of the sulphates of potash, soda or ammonia, or of any combination of any of the above-named salts in saturated brine, as set forth, through which means the chemical results stated are produced.

34,180.—Ralph Emerson, Jr., and F. Graham (assignors to Ralph Emerson, Jr.), of Rockford, Ill., for Improvement in Mowing Machines:

We claim the combination of the bent axle, c, and hand lever, G, with the arm, F, and bracket, f, when arranged for joint operation relatively to each other and to the machine, substantially in the manner described for the purpose set forth.

34,181.—Ralph Emerson, Jr., and F. Graham (assignors to Ralph Emerson, Jr.) of Rockford, Ill., for Improvement in Harvesters:

We claim the combination of the gearing frame, finger, beam, shoe, and dragstrap with the lifting lever, F, and detent standard, G, when the whole are arranged for joint operation, substantially in the manner described for the purpose set forth.

We also claim constructing the finger beam of a single sheet of metal bent near its center into a U-shape, so that the upper part shall project beyond the lower a sufficient distance to form a ledge to which the guard fingers may be secured, substantially in the manner described.

We also claim fastening the guards to the upper part only of the finger beam bent as described, in combination with the shoulders upon the shanks of the fingers, substantially in the manner described.

34,182.—Marks Fishel (assignor to himself and Adolph Opper and Leo. Popper), of New York City, for Improvement in Skeleton Skirts:

I claim securing the hoops, A A, to the tapes, B B, by means of fastenings, D, or their equivalents, passing through the eylets, C C, and across a portion of the tape between them, substantially as and for the purposes set forth.

34,183.—J. H. Linville (assignor to himself and L. J. Piper), of Altona, Pa., for Improvement in Iron Truss Bridges:

I claim, first, The construction of the lower chords of truss bridges of series of wide and thin drilled eye bars, C C, applied on edge between ribs, S S, on the bottoms of the posts and connected by pins, P P, supported in the diagonal tension braces, D D and E, all substantially as described.

Second, The posts, O A L O A L, composed each of two wrought-iron plates or bars, a a, distance pieces, b b, and rivets, J J, or their equivalents, and cast-iron braces, L L, and capitals, O O, the whole combined as specified.

[This invention consists in a novel construction of the lower chords and mode of applying the same, in combination with the posts and other parts of the truss. Also in a novel construction of the posts of wrought and cast iron.]

34,184.—M. P. Norton (assignor to himself and Charles Eddy & Co.), of Troy, N. Y., for Hand Stamp for Post Offices:

I claim the combination of four cylinders, a b c d, upon the shaft, c, with the stationary form of type, D D, whereby the day, month and year are given together by one impression, substantially as described and set forth.

I also claim the combination of the shaft, C, with four cylinders, a b c d, thereon arranged, with the frame, B, whereby the said cylinders are firmly held in their adjusted position, substantially as described and set forth.

34,185.—Allen Walton & J. L. Kite (assignors to Allen Walton), of Philadelphia, Pa., for Improvement in Process of Manufacturing Illuminating Gas:

We claim injecting a steady and continuous stream of air into a retort in which gas is generated from coal oil, or its equivalent, as and for the purpose set forth.

34,186.—John Powers and E. M. Smith (assignors to J. S. Mitchell), of New York City, for Improvement in Harvesters:

We claim, first, The attaching of the fingerbar, A, to the main frame, G, of the machine by means of the bars, D D, connected by joints, a a, to the upright sliding bars, F F, on the main frame, G, substantially as and for the purposes set forth.

Second, The use of guard fingers having backs, h, and edges, k k, extending continuously along the bar so as to present closed surfaces in front and beneath, and formed with channels or grooves, i, extending beneath the sickle bar and partially around the bolt holes, l, and open at back to permit the ready escape of moisture, dirt, gum or trash which may work underneath the sickle bar.

Third, Having the bar, N, which forms a portion of the lifting or elevating mechanism of the finger bar, A, fitted loosely underneath the main frame, H, to admit of longitudinal play of said bar for the purpose of allowing the finger bar to be turned up against the main frame, as set forth.

RE-ISSUES.

1,257.—American Flask and Cap Co., of Waterbury, Conn., assignees of Charles Hicks, of Haverstraw, N. Y., for Improvement in Machine for Varnishing Percussion Caps. Patented Feb. 17, 1857:

We claim, first, A series of rods, b, or their equivalents, connected by any suitable means, and a plate, A, perforated at distances to correspond with the rods employed in combination to apply varnish or other material to a number of caps simultaneously.

Second, The combination of a frame, c c′ c*, carrying a number of wires or rods, b b, or their equivalents, to take up the varnish, a trough, E, to contain the varnish and suitable guides above the said trough to receive a plate which carries the caps, the whole being constructed and operating together substantially as described.

Third, The plate, H, containing holes corresponding in number and arrangement with the wires or rods, b b, or their equivalents, arranged relatively to the trough, F, the vertically-moving frame, c c′ c*, and the guides, G, substantially as described for the purpose set forth.

[This important invention greatly reduces the labor in the manufacture of percussion caps, by applying, simultaneously to a large number, the adhesive material by which the fulminate is secured within the cup, or protected from moisture.]

1,258.—J. H. Dennis, of Louisville, Ky., for Improved Mode of Collecting Fares on Street Railway Cars. Patented Dec. 17, 1861:

I claim as an improvement in street railroad cars the combination of the platformless rear, either without a door or with one for exit only, with the platform and door in front, whereby all persons entering the car, being compelled to pass the driver, he can, without inconvenience, act as collector or oversee the deposit of their fares.

[This invention, as the claim explains, dispenses with the necessity of a separate collector in street railroad cars, by enabling the driver, without inconvenience to himself or the passengers, to act also as collector.]

1,259.—Harrison Kalbach and Mary Andrews (acting executors of Abraham Andrews, deceased), of Bernville, Pa., for Improvement in Horizontal Water Wheels. Patented August 30, 1859:

We claim, first, The curved concave buckets having curved or eccentrically-formed tops and bottoms, as described.

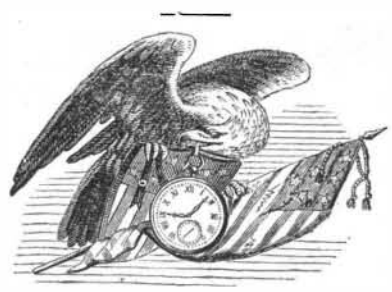
Second, In combinations with the buckets carved as describe, the spiral water way or chamber underneath them, arranged within a box, A, substantially as shown and described.

[The nature of this invention relates to the peculiar construction of the buckets of a horizontal water wheel, by means of which a greater effect of the water is obtained than in wheels used heretofore. It also relates to a spiral water way or chamber, in connection with the buckets aforesaid.]

STUDENT'S DRAFTSMAN AND ARTISAN'S MANUAL. By S. E. Warren, C. E., Professor of Descriptive Geometry in the Rensselaer Polytechnic Institute, Troy, N. Y. Published by John Wiley, No. 56 Walker Street, this city.

This is a manual of elementary geometrical drawing, designed for various schools, and self-instruction to mechanics and others. It embraces five divisions of subjects, viz., first, Elementary Projections; second, Details of Constructions in Masonry of Wood and Metal; third, Rudimentary Exercises in Shading; fourth, Isometrical Drawing; fifth, Elementary Structural Drawing. The lessons are illustrated with a great number of excellent plates, and the instructions for stone, wood and iron work are simple and generally useful. It is a work well adapted for every person who desires to obtain a knowledge of geometrical drawings.

PATENTS FOR SEVENTEEN YEARS.



The new Patent Laws enacted by Congress on the 2d of March, 1861, are now in full force, and proveto be of great benefit to all parties who are concerned in new inventions.

The duration of patents granted under the new act is prolonged to SEVENTEEN years, and the government fee required on filing an application for a patent is reduced from $30 down to $15. Other changes n the fees are also made as follows:—

On filing each Caveat	$10
On filing each application for a Patent, except for a design	$15
On issuing each original Patent	$20
On appeal to Commissioner of Patents	$20
On application for Re-issue	$30
On application for Extension of Patent	$50
On granting the Extension	$50
On filing Disclaimer	$10
On filing application for Design, three and a half years	$10
On filing application for Design, seven years	$15
On filing application for Design, fourteen years	$30

The law abolishes discrimination in fees required of foreigners, excepting reference to such countries as discriminate against citizens of the United States—thus allowing English, French, Belgian, Austrian, Russian, Spanish, and all other foreigners except the Canadians, to enjoy all the privileges of our patent system (exceptin cases of designs) on the above terms.

During the last sixteen years, the business of procuring Patents for new inventions in the United States and all foreign countries has been conducted by Messrs. MUNN & CO., in connection with the publication of the SCIENTIFIC AMERICAN; and as an evidence of the confidence reposed in our Agency by the Inventors throughout the country, we would state that we have acted as agents for more than FIFTEEN THOUSAND Inventors! In fact, the publishers of this paper have become identified with the whole brotherhood of Inventors and Patentees at home and abroad. Thousands of Inventors for whom we have taken out Patents have addressed to us most flattering testimonials for the services we have rendered them, and the wealth which has inured to the Inventors whose Patents were secured through this Office, and afterward illustrated in the SCIENTIFIC AMERICAN, would amount to many millions of dollars! We would state that we never had a more efficient corps of Draughtsmen and Specification Writers than are employed at present in our extensive Offices, and we are prepared to attend to Patent business of all kinds in the quickest time and on the most liberal terms.

The Examination of Inventions.

Persons having conceived an idea which they think may be patentable, are advised to make a sketch or model of their invention, and submitit to us, with a full description, for advice. The points of novelty are carefully examined, and a reply written corresponding with the facts, free of charge. Address MUNN & CO., No. 37 Park-row, New York.

Preliminary Examinations at the Patent Office.

The advice we render gratuitously upon examining an invention does not extend to a search at the Patent Office, to see if a like invention has been presented there, but is an opinion based upon what knowledge we may acquire of a similar invention from the records in our Home Office. But for a fee of $5, accompanied with a model or drawing and description, we have a special search made at the United States Paten Office, and a report setting forth the prospects of obtaining a Paten &c., made up and mailed to the Inventor, with a pamphlet, giving instructions for further proceedings. These preliminary examinations are made through our Branch Office, corner of F and Seventh-streets, Washington, by experienced and competent persons. More than 5,000 such examinations have been made through this office during the past three years. Address MUNN & CO., No. 37 Park-row, N. Y.

How to Make an Application for a Patent.

Every applicant for a Patent must furnish a model of his invention. If susceptible of one; or if the invention is a chemical production, he must furnish samples of the ingredients of which his compositon consists, for the Patent Office. These should be securely packed, the inventor's name marked on them, and sent, with the government fees by express. The express charge should be prepaid. Small models from a distance can often be sent cheaper by mail. The safest way to remit money is by draft on New York, payable to the order of Munn & Co. Persons who live in remote parts of the country can usually purchase drafts from their merchants on their New York correspondents; but, if not convenient to do so, there is but little risk in sending bank bills by mail, having the letter registered by the postmaster. Address MUNN & Co., No. 37 Park-row, New York.

Rejected Applications.

We are prepared to undertake the investigation and prosecution of rejected cases, on reasonable terms. The close proximity of our Washington Agency to the Patent Office affords us rare opportunities for the examination and comparison of references, models, drawings, documents, &c. Our success in the prosecution of rejected cases has been very great. The principal portion of our charge is generally left dependent upon the final result.

All persons having rejected cases which they desire to have prosecuted are invited to correspond with us on the subject, giving a brief history of the case, inclosing the official letters, &c.

Caveats.

Persons desiring to file a Caveat can have the papers prepared in the shortest time by sending a sketch and description of the invention. The government fee for a Caveat, under the new law, is $10. A pamphlet of advice regarding applications for Patents and Caveats, in English and German, furnished gratis on application by mail. Address MUNN & CO., No. 37 Park-row, New York.

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Foreign Patents.

We are very extensively engaged in the preparation and securing of Patents in the various European countries. For the transaction of this business, we have offices at Nos. 66 Chancery-lane, London; 29 Boulevard St. Martin, Paris; and 26 Rue des Eperonniers, Brussels. We think we can safely say that THREE-FOURTHS of all the European Patents secured to American citizens are procured through our Agency.

Inventors will do well to bear in mind that the English law does not limit the issue of Patents to Inventors. Any one can take out a Patent there.

Circulars of information concerning the proper course to be pursued in obtaining Patents in foreign countries through our Agency, the requirements of different Patent Offices, &c., may be had gratis upon application at our principal office, No. 37 Park-row, New York, or either of our Branch Offices.

Assignments of Patents.

The assignment of Patents, and agreements between Patentees and manufacturers, carefully prepared and placed upon the records at the Patent Office. Address MUNN & CO., at the Scientific American Patent Agency, No. 37 Park-row, New York.

It would require many columns to detail all the ways in which the Inventor or Patentee may be served at our offices. We cordially invite all who have anything to do with Patent property or inventions to call at our extensive offices, No. 37 Park-row, New York, where any questions regarding the rights of Patentees, will be cheerfully answered.

Communications and remittances by mail, and models by express (prepaid), should be addressed to MUNN & CO., No. 37 Park-row, New York.

TO OUR READERS.

Models are required to accompany applications for Patents under the new law, the same as formerly, except on Design Patents, when two good drawings are all that is required to accompany the petition, specification and oath, except the government fee.

INVARIABLE RULE.—It is an established rule of this office to stop sending the paper w n he time for which it was pre-paid has expired.

PATENT CLAIMS.—Persons desiring the claim of any invention which has been patented within thirty years, can obtain a copy by addressing a note to this office, stating the name of the patentee and date of patent, when known, and inclosing $1 as fee for copying. We can also furnish a sketch of any patented machine issued since 1853, to accompany the claim, on receipt of $2. Address MUNN & CO., Patent Solicitors, No. 37 Park Row, New York.

RECEIPTS.—When money is paid at the office for subscriptions, a receipt for it will always be given; but when subscribers remit their money by mail, they may consider the arrival of the first paper a *bona fide* acknowledgment of our recention of their funds.

NEW PAMPHLETS IN GERMAN.—We have just issued a revised edition of our pamphlet of *Instructions to Inventors*, containing a digest of the fees required under the new Patent Law, &c., printed in the German language, which persons can have gratis upon application at this office. Address MUNN & CO.,
No. 37 Park-row, New York.

Notes and Queries

A. Y. McD., of Iowa.—When a cubic inch of air is heated in a confined space up to 491° Fah. it exerts a pressure of 15 lbs. on the square inch. Air at the freezing point expands 1-491st part of its bulk for every addeddegree of heat on Fahrenheit's scale. Airnever can be used to advantageunder high pressure, because it only exerts 30 lbs. pressure on the square inch when heated to 982° Fah. which is almost red temperature. We have no statistics of experiments with compressed air.

M. N. of N. Y.—If you wish to know how to preserve a collection of birds, reptiles, insects &c., you should write to some bookseller in this city and obtain a work on the subject.

H. D., of Mich.—We do not know what your ideas are respecting a perpetual motion. If you think you have invented a machine capable of setting itself in motion and continuing throughout all time, then you are probably following on a wild-goose chase—the thing cannot be done. Whenever you can succeed in lifting yourself over a fence by seizing hold of the waistbands of your pantaloons, then you can invent a perpetual motion. Do not waste your inventive genius in trying to create that which man has no power to do.

J. E., of N. H.—The weighing and packing machine to which you refer, was exhibited at the Crystal Palace, in the fall of 1853. You will find an engraving of it in the SCIENTIFIC AMERICAN, November 5, 1853. The exhibitors were N. B. Hanes & Co., Philadelphia.

G. W. H.,———.—A great many modifications have been made in skates and a large number of patents granted. We have seen an arrangement somewhat like yours and have therefore some doubts about its patentability We would advise you if you intend to prosecute the case further to have a preliminary examination made at the Patent Office If you had given us your Post-Office address we should have written to you by mail.

L. C. C., of Mass.—About 13 cubic feet of atmospheric air weighs one pound. Hence to float 2,240 lbs. in the air would require a balloon of a capacity of 29,120 feet, provided the balloon was entirely empty and had no weight. But to support the weight of the hydrogen gas (about 200 lbs.) and the weight of the balloon, we must have about 36,000 cubic feet of displacement.

A. H. B., of Mass.—If a propeller made a complete turn or convolution around its axis, its length measured along its axis would be its pitch. Whatever fraction of one whole turn a propeller may form, its pitch is the length of a complete convolution at the same rate of twist.

D. D. B., of Ohio.—Your methods of solving some problems in trigonometry do not appear to us any shorter or more convenient than those usually employed.

D. McK., of Pa.—Simply applying an old process to a new use is not patentable. To enable us to judge in your particular case we shall need to know all the facts. A very slight change in combinations will often produce important results.

W. S., of Ill.—Cheap black varnish for metal work is made by dissolving 45 lbs. of powdered asphaltum in 6 gallons of prepared boiled linseed oil. Heat the whole in an iron vessel and stir until the asphaltum is dissolved. Take off and cool and thin it down for use with turpentine. When this varnish is put on iron work, the latter should be baked in an oven heated to about 23°. A finishing coat of lac varnish gives the metal a more beautiful surface.

J. H. C., of Md.—It is not stated that Reynaud's new French powder described on page 8, current Vol. SCIENTIFIC AMERICAN, is a good substitute for common gun powder. It may be very excellent for blasting rocks and coal in mines, as it is comparatively inexpensive to manufacture.

K. B. C., of Pa.—If you go to London yourself there is no doubt about your being able to get your articles into the great exhibition, if presented in time. We suppose exhibitors will be admitted free. This is always customary.

P. H. W., of N. Y.—By reference to the card of Richard Kitson, in another column, you will learn where you can purchase a picker.

R. W. H., of N. Y.—You can obtain a camera of Messrs. Pike & Sons, of this city.

W. B. G., of Ohio.—The name of Silliman's *Journal* is the *American Journal of Science and Arts*. It is now in its XXXIII Vol. and continues to be published by Professors B. Silliman & B. Silliman, Jr. and James D. Dana, at New Haven, Conn. Six numbers are issued in a year—one every two months. The price is five dollars per year. The January number is one of the best we have ever seen.

W. J. L., of N. Y.—The precession of the equinoxes is just as simple as the wabbling of a top; but if you try to misunderstand it you will doubtless succeed.

A. M. K., of Conn.—You will find a description of artificial ivory on page 112, Vol. XIV. (old series) SCIENTIFIC AMERICAN. White oxide of zinc mixed with soluble glass, or white shellac varnish makes artificial ivory. Fine white chalk mixed with a clear varnish makes a white cement, that may be molded into any form and when dried in an oven it partially resembles ivory. We have seen several compositions intended to be used as substitutes for ivory, but none of them possessed the delicate and beautiful appearance of the genuine article.

J. M., of N. J.—We think well of your improvement in cartridges to obviate the necessity of biting, and are of opinion that you could obtain a patent for it.

O. P., of N. Y.—To coat cast iron with zinc, first scour it bright with sand and dilute muriatic acid, to remove the oxide, then wash it thoroughly in warm soft water. Melt some pure zinc in an iron vessel, place a layer of powdered salammoniac on its surface, and draw the light cast iron articles slowly through this batch of molten metal, take them out and throw them into cold water. If the castings are heavy, they should be dried and heated to 212° before dipping them into the zinc.

J. W. K., of N. Y.—You must send us a full description of your alleged improvement in iron punches, and we will give you our opinion respecting its novelty.

SPECIAL NOTICE—FOREIGN PATENT.—The population of Great Britain, is 30,000,000; of France, 35,000,000; Belgium, 5,000,000; Austria, 40,000,000; Prussia, 20,000,000; and Russia, 60,000,000. Patents may be secured by American citizens in all of these countries. Now is the time, while business is dull at home, to take advantage of these immense foreign fields. Mechanical improvements of all kinds are always in demand in Europe. There will never be a better time than the present to take patents abroad. We have reliable business connections with the principal capitals of Europe. Nearly all of the patents secured in foreign countries by Americans are obtained through our agency. Address Munn & Co., 37 Park-row, N. Y. Circulars about foreign patents furnished free.

Money Received

At the Scientific American Office on account of Patent Office business. during one week preceding Wednesday, Jan. 22 1862:—

S. and L. A. D., of R. I., $20; E. C., of Mass., $20; H. W. M., of N. Y., $20; C. M. S., of Conn., $20; W. D. B., of Mass., $25; J. C., of Conn., $25; T. B., of N. Y., $25; G. B. O., of N. Y., $15; G. S. L., of O., $20; G. and B., of Mich., $25; G. R. S., of Wis., $15; A. S., or N. Y., $40; D. C. H., of Pa., $25; D. B., of Conn., $25; A. J. G., of Mass., $43; H. B. M., of N. Y., $10; J. W. H., of N. J., $30; L. and E. D. G., of N. Y., $15; H. S. J., of N. Y., $30; J. H. E., of Pa., $20; A. McG., of N. Y., $20; R. S., of N. Y., $20; E. D. and R. G., of N. Y., $20; G. M. N., of Ill., $25; C. E. L. H., of Conn., $35; T. S. B., of N. Y., $15; L. and B., of N. Y., $40; C. G., of Mass., $15; B. M., of Pa., $100; E. J. L., of N. Y., $15; C. and G. M. W., of N. Y., $250; W. and P., of O., $15; N. G. C., of N. Y., $15; R. L. B., of Mich., $25; J. H., of N. Y., of $15; B. J. C. H., of N. Y., $15; T. S., of N. Y. $10, O. S., of Vt., $15; K. H. E., of Vt., $15; M. B. W., of N. Y., $25; T. O., of France, $45; A. S., of N. Y., $20; A. S. K., of Mich., $20; C. S., of N. Y., $25; La B., and D., of Ill., $40; McK. and F. of N. Y., $15; P. H. D., of N. Y., $45; G. M. Z., of O., $25; M. S. W., of Pa., $25; C. B. H., of Mass., $33; W. R. P. of O., $25: R. J., of O., $15; J D. S, of Ill., $20; M. and S. G. T., of O., $25: J. P., of N. Y., $15; J. L., of Mass., $10; C. P., of R. I., $15; C. H. C., of N. Y., $15; G. M. H., of N. Y., $25; S. W. M., of N. Y., $40.

Specifications and drawings and models belonging to

parties with the following initials have been forwarded to the Patent Office from Jan. 15 to Wednesday Jan. 22 1862:—

J. R. A., of Pa.; A. B., of Mich.; M. S. W., of Pa.; T. O., of France; J. C., of Conn.; T. B., of N. Y.; W. D. B., of Mass.; J. L. P., of N. Y.; C. G., of Mass.; La B. and D., of Ill.; C. S., of N. Y.; G. M. Z., of O.; G. M. N., of Ill.; H. S., Jr., of N. Y.; C. B. H., of Mass,; G. and B., of Mich.; W. R. P., of O.; O. S., of Vt.; P. H. D., of N. J.; A. J. G., of Mass.; J. H. S., of N. Y.; M. O. S. G. T., of O.; R. L. B. of Mich.; M. B. W., of N. Y.; D. C. K., of Pa.; L. and B., of N. Y.; G. M. H., of N. Y.; A. R., of N. Y.; A. S., of N. Y.

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For further particulars, address—

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WORLD'S FAIR, LONDON, MAY, 1862.—PARTIES having articles of any description, and particularly machinery, patent rights, and any thing in the mechanical line which they wish to exhibit at the coming World's Fair, will find it to their interest to intrust them to the subscriber, who was an exhibitor at the World's Fair, in Paris, 1855, and has lately returned from Europe, where he made himself generally acquainted with all the rules, regulations and general arrangements and designs of the Exhibitions.

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This will offer an unequaled opportunity for selling as well as showing American articles, of which there are very many, entirely unknown in England, that have only to be shown to find a ready sale.

The subscriber will be personally on the ground, to attend to any business entrusted to him, either connected with the exhibition or making sales in London or Paris. His terms will be reasonable, and his whole time devoted to the business.

Parties intending to exhibit must make application for space without delay, and all articles must be in the exhibition before March 31, 1862.

The subscriber will receive goods intended for the Exhibition up to March 10, 1862.

For further particulars address

GEORGE H. SANBORN,
No. 15 Harvard Place, opposite Old South Church, Boston. After March 20th, No. 100 Fleet street, London, England.

REFERENCES—Marshal P. Wilder, Esq., Boston, Commissioner to the World's Fair; Frederick H. Stimpson, Esq., President Massachusetts Charitable Mechanic Association; Oliver B. Dorrance, Esq., United States General Appraiser, No. 177 State street, Boston; Henry A. Gane, Nos. 50 and 52 Cornhill, Boston; H. Griffin & Son, Nos. 54 and 56 Duane street, New York; Ezra Carter, Jr., Esq., Portland, Maine; Hall Roberts, Esq., President State Central Bank, Concord, N. H.; John Gates, Esq., Worcester, Mass.; Cooper & Frye, No. 522 Minor street, Philadelpeia, Pa., Charles F. Wilstanch, Esq., President Ohio Mechanics' Institute, Cincinnati, Ohio; George W. Simpkins, No. 251 Main street, St. Louis, Mo. 5 1

AN IMPORTANT WORK—JUST PUBLISHED.—Chisholm's Mathematical Mechanical Scale and Key; an instrument for solving problems in arithmetic, geometry, and trigonometry without the use of tables. Price $2 50. G. W. COTTRELL, No. 36 Cornhill, Boston. For sale in New York by Sheldon & Co., No. 115 Nassau street and Leavitt & Allen, No. 21 Mercer street. 2 4*

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NEW WATER-ROOFING SOLUTION, FOR RENDERing Woolen or Cotton Garments or Cloth Impervious by Water.—This solution, the result of chemical inquiry and experiment, is of the greatest use and value to all persons who, from their out-door employments, are exposed to the vicissitudes of the weather, either as travelers, cartmen, milkmen, omnibus, hackney, stage coach or other carriage drivers, butchers, grocers, builders, masons, all out-door laborers, sportsmen, &c.; also, to the troops now organizing, and to the army and navy in active service. The public are assured,

First, That the effect produced on garments treated with this solution is to make them, by a single immersion, quite impervious by water, and this effect continues in full force until the clothes are worn out.

Second, It will not, in any degree, affect the texture or durability of cloth, nor injure any color.

Third, It does not, like rubber goods, swelter the skin, or prevent the transmission of the vapor of perspiration occasioned by heat or violent exercise—in a word, it permits air to pass through it, but not water.

Fourth, So perfectly are these desirable effects produced that any person may be exposed for a whole day in a heavy storm, with rain shedding from his coat, but none will penetrate his clothing, and he may return to his home with his inner clothing quite dry, and his outer garment wet on the outside only.

Fifth, This solution, after it has been once applied, may be used for the protection of other garments, again and again, until all is used up, for its properties remain unimpaired to the last.

This solution is refined until it is transparent and nearly colorless; yet so energetic is the action of one application only that good or ordinary cloth treated with it, and formed into a hollow, will hold water like a metallic vessel, though always perfectly pliable, while cloth of the same quality which has not been treated with the solution, will allow water to drain through it in a few minutes.

Satisfactory arrangements for the sale or manufacture can be made by application to W. H. SAUNDERS, Hastings, on the Hudson, Westchester Co., New York. 1*

WM M'KAIN, OF PA., HAS INVENTED A MACHINE to Protect the Flour-Bolting Cloth in Mills from being destroyed by bugs or other insects. It consists of a wire screen of 14 to 16 meshes to the inch, extending through the bolting reel, permitting the flour and offal to pass through, and keeping the bugs inside the wire concaves, permitting them to pass out at the tail end. Patented Dec. 24, 1861. For further particulars address WM. M'KAIN, Marietta, Lancaster Co., Pa. 1

TO CLOCK MANUFACTURERS.—HART'S SELFadjusting crank and pendulum clock escapement, just patented, for sale. The cheapest and believed to be the best in existence. Terms easy, but little cash required. A good portion would be taken in the clocks after they are manufactured. Here is a chance to monopolize the manufacture and sale for 17 years. See notice of it in No. 2, Vol. VI., SCIENTIFIC AMERICAN. The undersigned, the patentee, would be pleased to correspond before going East with models.
5 2* WM. HART, Mayesville, Wis.

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SOLID EMERY WHEELS,
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These wheels are consolidated upon an entirely new and scientific principle. Composed of pure Turkish Emery, free from glue, rubber, vulcanite, and all other glutinous substances; they are the only legitimate Emery Wheel ever introduced into the market.

They are manufactured of every number of Emery, fine or coarse, moulded to every size, and made in quality to any degree of hardness. They are true, and carefully balanced; and, as they always present an even surface, and do not glaze, are unequaled for cutting, grinding, sharpening and polishing purposes. Their durability and efficiency commend them as a matter of economy, to all workers in metals. We subjoin the following from many testimonials:—

MORGAN IRON WORKS, NEW YORK, Nov. 30, 1861.

NEW YORK EMERY WHEEL CO.—*Gentlemen:* Having given the Patent Solid Emery Wheel manufactured by you a severe trial, I do, without hesitation, pronounce it the best wheel I have ever used, as it cuts quick, wears slow, and does not glaze or soften by friction.

Respectfully yours, JOHN GALLIGHER,
Foreman Morgan Iron Works.

A descriptive circular, containing a list of prices, &c., will be forwarded on application. Address NEW YORK EMERY WHEEL CO., No. 28 Frankfort street, New York. 4 1

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PICKERS.—RICHARD KITSON, HEAD OF WORTHEN Street, Lowell, Mass., manufacturer of Kitson's Patent Cotton Mixer, Kitson's Patent Cotton Opener, Kitson's Patent Cotton Picker, Kitson's Patent Cotton Waste Machine, and Rag Picker; also Build's English Scutchers (pickers), of the following celebrated patterns:—Walker & Hacking; Lord & Brothers; Taylor, Lang & Co. Manufactures Needle Pointed Card Clothing, for Carding Hemp, Jute, Flax, &c. 4 4*

RENSSELAER POLYTECHNIC INSTITUTE, TROY, N. Y.—The seventy-sixth semi-annual session of this Institution for instruction in the Mathematical, Physical and Natural Sciences will commence Feb. 19, 1862. A full course in Military Science is now in progress. Further information, with the Annual Register, can be obtained of Prof. CHARLES DROWNE, Director. 3 6*

FOR SALE.—TWO TUBULAR BOILERS, EACH 18 feet long, 7½ feet diameter; can be seen at Delamater Iron Works. Apply to HARSTOW & POPE, No. 98 Pine street, New York. 3 4*

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Having always maintained the duty of good citizens in all parts of the land to stand by the Constitution, in its spirit and letter, when that Constitution was assailed and its overthrow attempted, we accordingly at once gave a cordial support to the Government in its patriotic endeavor to assert its lawful authority over the whole land. Believing secession to be rebellion, and when attempted, as in this case, without adequate reasons, to be the highest crime, we hold

1. That the war was forced upon us by the unjustifiable rebellion of the seceding States.

2. That the Government, as the ordinance of God, must put down rebellion and uphold the Constitution in its integrity.

3. That every citizen is bound to support the Government under which he lives, in the struggle to reëstablish its authority over the whole country.

4. That the Constitution of the United States is the supreme law of the Government as well as of the people; that the war should be prosecuted solely to uphold the Constitution and in strict subordination to its provisions; and the war should be arrested, and peace concluded, just so soon as the people now in revolt will lay down their arms and submit to the Constitution and laws of the land.

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Improved Lock for the Nuts of Railroad Bolts.

It is usual in well-constructed railroads to secure the ends of the rails where they meet, by bars fitted to the rails on each side and drawn snugly against them by bolts and nuts. It is found that the violent jar caused by the frequent passage of the cars is apt to loose the nuts and thus to release the ends of the rails from the firm hold of the fish bars. To prevent this grave inconvenience is the object of the invention here illustrated.

Fig. 1

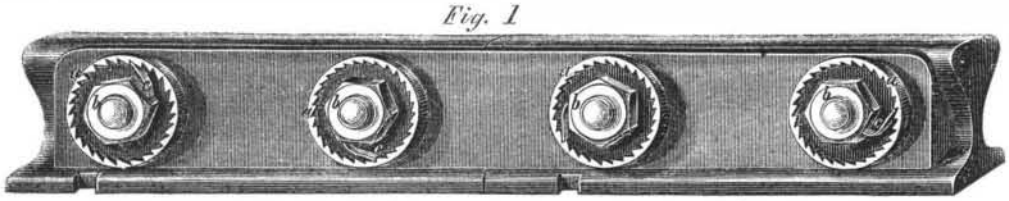


Fig. 2

LAWRENCE AND WHITE'S LOCKS FOR THE NUTS OF RAILROAD BOLTS.

A broad flat washer, *a*, Fig. 1, is placed around the end of the bolt beneath the nut. This washer has a raised edge or rim, upon the inner side of which is formed a ratchet as represented. To the nut is fastened a pawl, *c*, which catches into the ratchet and prevents the nut from turning back. This pawl is made of brass or copper in order that it may be readily bent whenever it is to be removed.

When the washer rests upon a wooden surface it may have short projections or spikes upon its under side to enter the wood and prevent it from turning; but upon an iron bar the friction of its own flat surface is sufficient.

This lock is adapted for securing the nuts of bridges, especially railroad bridges which are subjected to frequent violent vibrations.

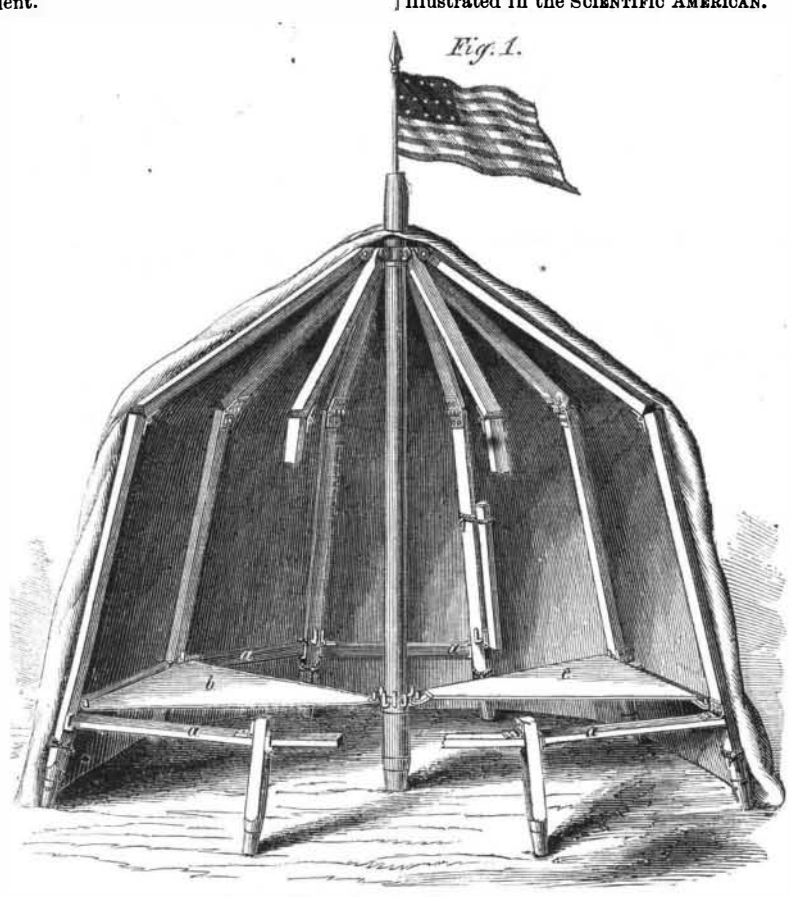
Patents for this simple and valuable invention have been granted, through the Scientific American Patent Agency, in England, France and the United States; the American Patent bearing date July 23, 1861. Further information in relation to the matter may be obtained by addressing the inventors, Henry Lawrence and Charles H. White, at Melrose, N. Y.

THE Gulf Stream reaches as far north as the coast of Spitzbergen.

Improved Army Tent.

It is stated on high authority that out of 15 cases of sickness occurring in armies 13 are caused by sleeping on the ground. Sickness in armies embarrasses military operations far more than would result from the simple abstraction of the sick men. A portion of the soldiers that are well must be detailed to take care of the sick, tents or other suitable shelter must be provided for their accommodation and they draw much more largely upon the transportation and other departments than when they are able to take care of themselves. It is therefore very desirable to keep an army in good sanitary condition, and if simply enabling the soldiers to sleep raised above the surface of the earth will prevent a very large part of the sickness, it certainly ought to be done. This truth is fully recognized by the most intelligent army surgeons, and many tents have been devised with raised cots for the soldiers to sleep on. Now, however, that the inventive talent of the whole community is directed to the subject, we are having numerous improvements on these devices, and all of any importance will be illustrated in the SCIENTIFIC AMERICAN.

Fig. 1.

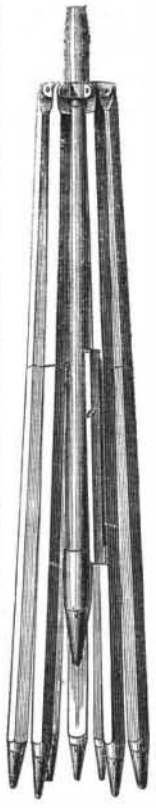


RANKIN'S ARMY TENT.

The accompanying engravings represent a cot tent invented by William Rankin, of this city. It consists in a central pole and a frame around the outside, with the cots extending from the pole to the frame; it being intended for the men to lie upon the cots with their feet pointing inward toward the pole.

The frame sticks are made of ash, or other light, strong wood, about two inches square, with hinged joints in them, as represented, to give greater room to the tent. These sticks are connected at a short distance above their lower ends by cross bars, *a a*, Fig. 1. These bars are hinged at one end to an upright, while the other end locks into a plate upon the next upright by a dovetail joint. The cot, *b*, is made of canvas, and its inner end is supported by a hook which is secured to a collar upon the pole, while its broad outer end is wrapped around the cross bar, *a*.

Fig. 2



This end is sewed into a loop, and at the time the tent is pitched the cross bar is pushed into the loop. During the day the inner ends of the cots are unhooked from the collar on the pole and buttoned up to the side of the tent, removing them completely out of the way.

A table, *c*, accompanies each tent. This is made of a thin board in the same form as a cot, and occupies one of the cot spaces. It is supported at the three corners by iron legs, which are bent so as to raise the table above the level of the cots, in order that the soldiers may put their legs under the table while sitting on the adjacent cots.

To strike the tent, the canvas is taken off and the frame folded snugly together, as represented in Fig. 2; the cross bars, *a*, lying by the sides of the uprights. The lower ends of the uprights and of the central pole may be shod with iron if this is deemed desirable.

This tent may be made to accommodate 12, 20 or 24 men, as may be desired, and it is estimated that it will weigh about the same, in proportion to the number of men that it will shelter, as the Sibley or other tents at present in use.

The patent for this invention was granted through the Scientific American Patent Agency, December 24, 1861, and further information in relation to it may be obtained by addressing the inventor, William Rankin, at No. 6 Astor House, New York city.

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